PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

JAN 4 1944

SCIENCE

NEW SERIES
VOL. 98, No. 2557

FRIDAY, DECEMBER 31, 1943

SUBSCRIPTION, $6.00
SINGLE COPIES, .15

Todd & Sanford's Clinical Laboratory Diagnosis

New (10th) Edition

By JAMES CAMPBELL TODD, M.D., formerly Professor of Clinical Pathology, University of Colorado; and ARTHUR HAWLEY SANFORD, M.D., Professor of Clinical Pathology, University of Minnesota (The Mayo Foundation). 911 pages, 6″ x 9″, with 544 illustrations on 380 figures, 32 in colors. $6.00

The New (10th) Edition of this established text and reference book is a fully up-to-date presentation of modern laboratory procedures and their technic, along with the interpretation of the findings in terms of clinical medicine.

Outstanding features of the book are its clarity and conciseness, the simplicity of the equipment needed to perform the various tests, and the 544 illustrations on 380 figures, 32 of which are in color.

Starting with a chapter on the microscope, the text proceeds through discussions of sputum, urine, the blood, clinical chemistry, gastric and duodenal contents, the feces, animal parasites, pus, puncture fluids, animal inoculation, serodiagnostic methods, bacteriologic methods, vaccines, biologic skin tests, miscellaneous examinations, etc. A very useful Appendix is included and also a practical Index-Outline of Laboratory Findings.

WEATHERWAX' Plant Biology

Dr. Weatherwax' text is very well suited to the Biology I course in the Navy V-12 program. The excellent geographic choice of plants makes it readily adaptable to all sections of the country and the profusion of fine illustrations have demonstrated their value in teaching.

By PAUL WEATHERWAX, Professor of Botany, Indiana University. 455 pages, 5¾″ x 8¾″, with 417 illustrations on 182 figures. $3.25

WILLIAMS' Anatomy and Physiology

New (7th) Edition!—In this text, anatomy and physiology are so presented as to give the student a clear and unified picture of the structure and function of the organs and systems of the body. Teachers find Dr. Williams' stimulating approach of great value in developing student interest.

By JESSE FEIRING WILLIAMS, M.D., Sc.D., Visiting Professor of Health and Physical Education, University of North Carolina. 573 pages, 5¼″ x 7¾″, with 344 illustrations, 7 color plates. $2.75

W. B. SAUNDERS COMPANY

West Washington Square — Philadelphia 5

Science: published weekly by The Science Press, Lancaster, Pa.
Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

Just Published

a new and different

MANUAL of MEDICAL PARASITOLOGY

This manual differs from others in presenting enough material to fit courses of varying size and emphasis at premedical or Freshman and Sophomore medical levels. It has been tested by several years' use at the University of Chicago.

It will be of special value in the present wartime situation to practicing physicians and laboratory diagnosticians as well as to teachers and students.

Emphasis is placed upon presenting the features of the life-cycles of parasitic animals necessary to an understanding of the transmission, epidemiology, control, diagnosis, pathology, and immunology of the diseases associated with the parasites.

Illustrations include an unusual five-color plate of the malarial parasites, making possible their rapid identification.

104 pages, 1 five-color insert, 11 illustrations in black and white, $1.50

THE UNIVERSITY OF CHICAGO PRESS

5750 Ellis Avenue, Chicago 37, Ill.

URINE AND URINALYSIS

By Louis Gershenfeld, Ph.M., P.D., D.Sc.

Philadelphia College of Pharmacy and Science

New (2d) edition. 12mo, 304 pages, illustrated with 42 engravings. Cloth, $3.25

This useful work offers an up to date monograph to those physicians who do their own laboratory work. It covers the usual as well as the unusual urinary constituents. The relative value of the different tests and the practical importance of the knowledge gained from each are emphasized throughout. The data presented will answer every purpose of the physician, the laboratory worker or the nurse.

LEA & FEBIGER

WASHINGTON SQUARE, PHILADELPHIA 6, PA.

POST-DOCTORAL SCHOLARSHIPS AT THE OHIO STATE UNIVERSITY

* * *

THE ELIZABETH CLAY HOWALD SCHOLARSHIP

Stipend $3000 for study in any field

MARY S. MUELLHAUPT SCHOLARSHIPS

Stipend $1400 to $1800 for study in any field of biology

For application blanks address

The Dean of the Graduate School
The Ohio State University
Columbus, Ohio

Applications must be received by March 15

College teacher, man, 22 years experience in two Eastern Metropolitan Universities, now employed, desires change to Liberal Arts, or Teachers College, offering campus contacts, degree of permanence and time for writing. Author college text and laboratory manuals. Major, Vertebrate Anatomy; Minors, General Biology, Invertebrate Zoology. Address Box M.M.H. c/o SCIENCE, Lancaster, Pennsylvania.

THE SCIENCE PRESS PRINTING CO.

PRINTERS OF

SCIENTIFIC AND EDUCATIONAL JOURNALS, MONOGRAPHS AND BOOKS

Correspondence Invited

LANCASTER, PENNSYLVANIA

Determination of Alcohol in Blood and Urine

(According to the method of H. A. Heise)

The LaMotte Research Department has developed a new, portable, self-contained Outfit for the quantitative determination of Alcohol in the blood and urine. The distillation assembly, accurate color standards, standardized reagents and all equipment is mounted in the case itself and is ready to use on a moment's notice. Standard equipment includes thermostatically controlled electric hotplate for 110–112 Volt A.C. current.

This new LaMotte Outfit comes complete, ready to use, with instructions. Price $50.00 F.O.B. Towson.

Write for further information:

LaMotte Chemical Products Co.

Dept. "H" Towson-4, Baltimore, Md.

SCIENCE

VOL. 98 FRIDAY, DECEMBER 31, 1943 No. 2557

The Kilgore Bill: DR. VANNEVAR BUSH 571

Obituary:
Recent Deaths 578

Scientific Events:
The Entomological Society of America; The American Society of Tropical Medicine; The New York Academy of Sciences; The Institute of Radio Engineers; The Fiftieth Anniversary of the Army Medical School; Officers of the American Chemical Society; Award of the Edison Medal to Dr. Vannevar Bush 578

Scientific Notes and News 581

Discussion:
Gigantic Drying Cracks in Animas Valley, New Mexico: WALTER B. LANG. *Pollen Record of Canadian Spruce and Fir from Texas Bog:* PROFESSOR J. E. POTZGER and PROFESSOR B. C. THARP. *A Forgotten Factor in Cardiac Physiology:* DR. O. S. GIBBS. *A Catalogue of Insecticides and Fungicides:* PROFESSOR DONALD E. H. FREAR. *The Giant Sequoia:* PROFESSOR EDWARD W. BERRY 583

Scientific Books:
Organic Chemistry: DR. MARSTON T. BOGERT. *The Electrical Industry:* DR. S. REID WARREN, JR. 586

Special Articles:
Purification and Character of the Swine Influenza Virus: DR. J. W. BEARD and OTHERS. *Decrease in Lactic Acid Content of the Brain in Poliomyelitis:* DR. HERMAN KABAT and OTHERS 587

Scientific Apparatus and Laboratory Methods:
A Rapid Iron Hematoxylin Tissue Stain for Routine Laboratory Use: DR. HERBERT S. KUPPERMAN and DR. CHARLES R. NOBACK. *A Myotome for Biopsy of Muscle:* LIEUTENANT ROBERT E. SHANK and DR. CHARLES L. HOAGLAND 591

Science News 8

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL; WARE CATTELL, assistant editor. Published every Friday by

THE SCIENCE PRESS
Lancaster, Pennsylvania

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington 25, D. C.

THE KILGORE BILL[1]

By Dr. VANNEVAR BUSH
DIRECTOR OF THE OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

As I promised in my letter of August 18, I am now writing you a further letter in regard to S. 702. It is a long letter, for I have commented not only on the bill itself, but also more broadly on the general subject, in the attempt to give you my thoughts in a constructive manner. These comments apply not only to S. 702 but also to its companion bill, H.R. 2100, which was introduced by Mr. Patman on March 5, 1943, and was referred to the House of Representatives Committee on Patents.

This problem that we both have been studying is exceedingly important. Since it may well involve the future health, comfort and safety of this nation to an extraordinary degree, its importance warrants all the effort which you and your committee have been devoting to it.

It has two phases. One is the appropriate organization of science and technology for the prosecution of the war. The second is the corresponding problem in times of peace.

In my opinion, these two phases can not be treated as a unit. In times of war this great democracy does many things that are aimed at a relatively brief intense effort. We centralize authority, subject ourselves to rationing and restraints and send our sons to fight under the necessary rigors of military organization. Events have already shown that a democracy which thus girds itself for war can contend successfully with the most rigid of totalitarian states. In fact, it can overcome them, for the resourcefulness, initiative and self-reliance which are engendered in a people by the privileges of democracy, when marshalled under a temporary authoritative war organization, can surpass by far the performance of any permanently regimented people in the complexities and technicalities of modern war. We have already proved this in Africa, in the Far East and over Europe, and we will prove it again and again as the war progresses.

[1] Letter to the Honorable H. M. Kilgore, United States Senate, Washington, D. C.

I trust that we as a people will never forget what we have learned and are learning during this war period.

Thus, in time of war, I believe in a centralized control, and I believe such control can appropriately be applied to science and its applications, if every effort is made in the process to preserve the independence of action of scientific and technical groups within their assigned spheres of action to the maximum possible extent. This has been the philosophy of the Office of Scientific Research and Development, and the record will show that it has been successful in its fields of development of new weapons and military medicine.

As applied to the war period, S. 702 seems to have four major objectives. First of all, it would alter the existing administrative organization of scientific activities by setting up an Office of Scientific and Technical Mobilization having the powers specified in Section 4 of the bill. Secondly, it would further amend the provisions of the Selective Training and Service Act of 1940, as amended, by setting up a separate procedure for the granting of occupational deferments to people having scientific or technical training and experience. Thirdly, the administrator of the Office of Scientific and Technical Mobilization would be given certain powers with respect to the requisitioning of scientific and technical facilities during the war. Lastly, the bill would vest in the Office of Scientific and Technical Mobilization very broad and far-reaching patent rights. I think that it may be helpful for you to have my comments on and reactions to each of those wartime objectives.

As I pointed out in some detail in my letter to you (dated December 7, 1942) commenting on the bill (S. 2721) that you introduced at the last Congressional session, there is an adequate existing administrative setup handling the necessary scientific war activities. Under Executive Order 8807, the President granted rather broad powers to OSRD, a temporary war agency, concerning the planning, coordination, initiation and support of scientific and medical national defense research activities. These powers have been carefully scrutinized for the past several years by the Congressional appropriation committees, and the Congress has seen fit to finance OSRD's operations by providing the necessary appropriations. Acting under that authority provided by the President and the Congress, OSRD has become the keystone of a closely integrated, highly cooperative organization of war research and development work for the Armed Services. That such an organization has been and is successful is best evidenced by the great confidence shown in it by the Armed Services and by the extremely important results that have been achieved.

It seems to me that it would be ill-advised and dangerous to throw a "monkey wrench" into such finely meshed machinery at this late date by such a major administrative change as is reflected in S. 702. Because of the inevitable disruption and confusion that would result from such a major organizational change, it seems to me that the Congress might better concentrate its efforts on remedying any flaws that you may find in our existing organization rather than attempt to superimpose an over-all organization at this late date in the war period.

The second major wartime change reflected in S. 702 concerns the better utilization of our scientific personnel by amending the Selective Service Act. Subject to that Act and all the powers and regulations of the War Manpower Commission, OSRD has mobilized a large percentage of the best qualified scientists and technicians of the country, primarily by means of the execution of contracts with educational institutions and industrial organizations whereunder specific war projects are conducted. However, OSRD's powers concerning the utilization of scientific personnel in war work have not included any authority to affect in any way the operations of the Selective Service System by controlling generally the disposition and utilization of men having scientific and technical training. The relationship of our scientific manpower to the Selective Service procedure has not, in my opinion, been clearly defined, and the procedure for ensuring that men of this special training are used to full advantage in places where their talents could best further the war effort has been ineffective. It seems to me that the prosecution of modern war requires the treatment of scientific men as a special group to be specially allocated for work in the fighting services and in civilian research, and that this can not be done adequately under the present procedures of the Selective Service System. There is no question here of shielding a special class against the rigors of war. It is rather the question of the intelligent use of a great nation's asset. The young men who make up this group should be under orders to serve where needed and, if the public interest indicates that they should remain in the laboratory rather than serve in the field, they should be retained in the laboratory. Likewise, when they are needed in the field they should be transferred there under orders to share the combat hazards with the members of the Armed Services in performing their duties. In other words, the scientific group should have their own selective service system, adapted to placing them exactly where needed.

My comments on this point are not intended to be in criticism of the efforts of the present Selective Service System because my point is directed rather to the legislative basis on which they operate. As a matter of fact, in spite of its inherent difficulty, much progress has been made on the job by the cooperation

between the various governmental agencies involved. The problem is far from solved, however, and even at this late date I think that it would be advisable to enact legislation placing the matter on a firm basis. Therefore, I suggest that the Congress might well consider Section 5 of S. 702 along with other pending legislation affecting the operations of the Selective Service System in order to work out as soon as possible a solution to this problem that is consistent with the solution to other manpower problems.

Concerning that part of S. 702 dealing with the requisitioning of scientific and technical facilities needed by the Government for war purposes, it seems to me that no such legislation is needed because the present patent and war emergency laws are adequate for the purpose. Under existing legislation, the Government has the right to requisition facilities and to use patents needed for war purposes in cases where it is not possible to negotiate with the owners. Although such power is now available for use, it has been the experience of OSRD that it is necessary to exercise such powers only in the most exceptional cases. As a whole, we have found the owners of facilities and patent rights to be more than willing to turn over the use of their property to the Government for war work on a reasonable basis.

The last point covered by S. 702 in wartime concerns the vesting in the Government of certain patent rights. On this point, I think that it is important for you and your committee to consider the possible effects of such legislation on the prosecution of the war. Since the declaration of the National Emergency on May 27, 1941, the Government has entered into thousands of contracts calling for work in connection with the development and improvement of war weapons. At least in the case of OSRD, all research and development work has been done under such contracts on a non-profit basis, both by educational institutions and commercial organizations. In handling inventions made by commercial organizations under its contracts, OSRD has followed the lead of the Army and Navy by providing in the contracts that the Government shall receive a royalty-free license to such inventions for specified purposes and that the title to such inventions shall vest in the contractors. In a great many such cases, of course, the contractors concerned have worked for many years, spent considerable sums of money and accumulated many patent rights before they arrived at the point of development reached at the time of the execution of their first Government contracts. Thus, work under government contracts frequently involves only minor adaptations of past inventions made by the contractors, and in such cases the contribution to the final product attributable to the work financed by the Government is relatively insignificant. In all such cases the Government has followed the theory that it should pay reasonable royalties for the use of inventions made prior to the Government contract and should receive only a royalty-free license for developments made under a Government contract.

The theory expressed in Section 7 of S. 702 constitutes a radical departure from the theory heretofore followed by the Government in dealing with war contractors concerning patent rights. I think that it is important to recognize the fact that such a radical departure undoubtedly will be vigorously fought by those persons and organizations opposed to the theory that the Government should be the owner and custodian of all inventions made since May 27, 1941, under contracts or other arrangements whereby the Government has contributed "any money, credit, physical facilities, or personnel." Even though provision is made for the payment of fair and just compensation for the seizure of such property rights, there will be many who will protest that the Government has broken faith with those who have relied upon equitable contractual agreements entered into in good faith by organizations whose primary purpose has been to make more effective the prosecution of the war. It is my considered judgment that the storm of controversy that would arise upon the enactment of such far-sweeping legislation, especially from those large commercial organizations whose complete cooperation and attention is vitally needed in the war program, would do irreparable harm to the united and concerted program for the development, improvement and utilization of war weapons that is now being carried on so effectively. Therefore, I suggest that consideration of a radical departure from the present governmental system of handling patent rights at least be deferred until after the war is won and that it then be made the subject of very careful study before action is taken.

On the general question of the advisability of such patent legislation, I wish to point out that the President has appointed a Patent Planning Commission which has been working on this general problem for some time. I regard the first report of the commission as being a valuable step toward effectuating certain advisable changes in our patent system, and I understand that the commission is now at work on a second report dealing with the problem of Government ownership of patent rights. In view of the complexity of the problem, I believe that it is advisable to await the results of the commission's study before any attempt is made to enact legislation.

My personal views concerning our patent system have been expressed before the Temporary National Economic Committee, but perhaps it will be helpful to summarize them here. In my opinion, one of the

primary factors bringing about our extraordinary technical advancement and our high standard of living has been the fact that this country has had a sound patent system stemming from the Constitution. That system now needs some revision in order to make it consistent with modern conditions and to benefit from our past experience. Any such revision, however, should be made deliberately and with great care so that the fundamentals which have proved so valuable to the country over a long period of time are not injured. I believe that it is essential to the health of our industrial life for us to have a constant influx of new, small and aggressive companies, and our sound patent system up to date has made possible the advent of such companies. Thus, it seems to me that basically our present patent system furthers the public interest.

Of course, it is inevitable that over a period of time the Government should accumulate a large number of patent rights, especially considering the present number of Government employees and Government contracts providing for such acquisition. I agree with other commentators that at the present time we have no fully adequate method of handling such patent rights for the full benefit of the public, and I am in complete sympathy with the attempts of the Patent Planning Commission to work out a uniform administration applicable to all Government agencies that will be in the best public interest. However, inasmuch as the patent system problems cover many issues that are complicated by war conditions and are quite unrelated to the general scope of S. 702, I think that the problem requires separate legislative treatment and full consideration by all the Congressional committees having jurisdiction over patent problems.

Summarizing my views on the wartime aspects of S. 702, it seems to me that (i) the proposed administrative changes are undesirable and would be detrimental to the effective prosecution of the war, (ii) the proposed requisitioning power covering scientific facilities is not needed, (iii) the proposed change in the Selective Service System concerning scientists and technicians should be considered carefully by all the Congressional committees studying the manpower problem, and (iv) the proposed changes affecting inventions and patent rights should not be made during wartime because it would be a source of confusion and dissatisfaction that would be harmful to the war effort, but certain such proposals might profitably be referred to the Senate and House Committees on Patents for consideration along with other suggestions concerning the improvement of our patent system. Thus, I conclude that no over-all legislation of the type embodied in S. 702 is needed at this time concerning the organization of scientists in connection with the war effort.

That leads me to approach S. 702 from the standpoint of studying its proposals concerning the appropriate peace-time organization by the Government of the scientific affairs of the country. This aspect is fully as important as the first, especially since we are getting along reasonably well in applying science to the war effort, and it is important for the prosperity and safety of the country that equally successful relations between the Federal Government and the scientists be maintained in the years of peace to come.

You and I have in view the same end; namely, the best furtherance of science for the benefit of the country. Although we may differ in our analysis of the methods to be followed in achieving that objective, I think that the matter is of such importance that it should be studied from every angle and every shadow of thought explored in an attempt to reach the best solution. It is in what I think is a spirit of constructive criticism that I find myself in disagreement with details of the peacetime aspects of S. 702 and even more strongly with the underlying philosophy upon which they are formulated. I am in agreement with other aspects of the bill, however, and I shall attempt to emphasize these and point out the means which my experience in science and Government leads me to believe will form the basis for beneficial legislation.

Before discussing the effect of the proposed legislation on different scientific groups, it seems advisable to point out that my analysis is based on the assumption that "all agencies and departments of the Federal Government," as used in Section 4 (f) of S. 702, means "all agencies (of the Federal Government) and departments of the Federal Government." If a broader meaning is intended under which the power of coordination given to the Office of Scientific and Technical Mobilization would extend to non-governmental agencies as well as agencies of the Federal Government, many of the comments which I shall set forth below would be quite different. The question of interpreting properly the quoted words brings up what I think is a fundamental inconsistency between the extremely broad purposes set out in Section 1 of S. 702 and the much more limited powers that would be given to the Office of Scientific and Technical Mobilization under Section 4 in order "To effectuate the purposes of this Act, . . ." It seems to me that this inconsistency should be recognized by a narrower definition of the purposes of the Act.

There are three great groups of scientific and technical men in this country: those in public service, those in industry and those in universities and non-profit independent scientific institutions. In considering the

need for central control over science by the Federal Government beyond that which existed prior to the war, it is necessary to examine and analyze these three groups separately.

We should, of course, continue scientific activities on the part of agencies and departments of the Federal Government, and the Congress should support such activities generously because there are many phases of scientific work that can best be done by men in the Government service. As a nation we can be proud of the accomplishments of many of our Government laboratories, such as the Bureau of Standards, the Public Health Service, several of the Department of Agriculture laboratories, and so on. In the past there have been several proposals to centralize all government scientific work in a single department, possibly making this a new Department of Science with cabinet representation. This idea is attractive to many, especially as it would seem to give an added recognition and support to science in Government departments. There are, however, several disadvantages to such a full unification of governmental scientific effort that should be weighed carefully before any such move is effected.

The greatest difficulty would lie in divorcing each separate Government scientific effort from close association with the department most interested in its work. For example, the scientific work of the Bureau of Entomology and Plant Quarantine, the Bureau of Agricultural Chemistry and Engineering, and other such bureaus, are almost inseparably connected with the work of the Department of Agriculture as a whole. Similarly, the Geological Survey derives strength by being a part of the Department of the Interior. Examples of this sort could be multiplied. I am sure that centralized control by a new independent agency of all scientific work in Government departments would be strongly resisted. Certainly the War and the Navy Departments would insist that they control absolutely the secret work on new weapons which they conduct in their own laboratories in times of peace, much as they might be willing to supplement their own activities by requesting and receiving help from the universities, industry and other governmental laboratories. Therefore, I have come to the conclusion that it would be difficult to gather all science activities of the Government into one organization without serious sacrifice. As a matter of fact, I judge that you have reached the same conclusion because I do not find any such complete integration of governmental research in the bill.

In Section 4 (f), however, I do find a provision for the coordination of the governmental research activities of the various federal agencies and departments. This, I judge, is not intended to imply either power to direct or power to control, independent of the heads of departments and agencies, but rather a central scientific clearing house set up for the interchange of data and plans in order to prevent overlapping and to facilitate that cross-fertilization of scientific effort which is often highly valuable. I have long thought that a body set up for this explicit purpose might perform a very useful function. It should certainly have joined with it an advisory scientific group, drawn on a voluntary basis from the best qualified scientific personnel of the country. There has been an increasing tendency in recent years, much to be welcomed, for individual bureaus to establish such advisory groups for their own purposes. They have often acted as reviewing bodies for the heads of the departments concerned, and their influence has been important and beneficial. A central body would form a desirable linkage between these.

In passing, allow me to present a thought in this connection which is not a part of the bill, but which is allied with this matter. I have often wondered that the Congress and its committees do not avail themselves more freely of the advice of the scientists of the country. True, the Congress has available all the scientific men in the executive departments for aid when it approaches a problem of scientific nature, but it does not often call upon more widely constituted groups. The departments and agencies often seek advice in this manner, turning usually to the National Academy of Sciences, which was constituted by Congress for this explicit purpose. Some agencies, notably the National Advisory Committee for Aeronautics, include scientific men in their organizations who serve on a voluntary basis, and I think that all will agree that this has worked well in the case of the N.A.C.A. But the committees of Congress themselves seldom use the scientists of the country directly, much as these men are willing to thus contribute their services voluntarily to their country's welfare and interests, and I feel that this could be done to advantage.

It may well be asked, how does one select scientists for this and similar purposes, in order to be sure of their ability and disinterestedness. Such a question is pertinent to a discussion of the bill, for I feel that its provisions for the selection of the necessary scientific personnel are not adequate for ensuring the services of men of the necessary caliber.

There is only one sound criterion for estimating the standing and capability of a man of science, and that is the evaluation of the way in which he is regarded by his colleagues in his profession. If there were only one way of doing this, perhaps it might not suffice, but there are many. Membership in scientific societies of

standing is important, wherever such membership is dependent upon evaluation and election. Recognition by learned bodies is a guide. There are even lists of outstanding scientists, prepared by taking ballots among scientists themselves. Some of the scientific bodies, notably the National Academy of Sciences, have the recognition of the Congress in their charters. The American Association for the Advancement of Science, through a carefully prepared system of representation, integrates the large membership in very many scientific organizations throughout the country. It seems to me that some of this existing machinery should be utilized in the procedure of selecting representative scientists for a governmental purpose in order to select representative men having the confidence of scientists generally. It can safely be assumed that men selected for eminence in science by scientists themselves will also generally be disinterested, for men can very seldom rise to real prominence in science in the estimation of their colleagues unless they place science itself first in the ordering of their professional careers.

In reviewing the bill, and in thinking of post-war scientific organization generally, I believe this point is important, and it seems to me that the present provisions in the bill for securing the services of scientists in the contemplated organization are not designed to secure the best men possible. Furthermore, these same comments apply to the membership of the so-called National Scientific and Technical Board and the Advisory Committee.

My summary, then, so far as this first group of Government scientists is concerned, is that the bill does not now provide adequately for the correlation of their efforts, that it would be inadvisable to extend the bill to the point where unitary control of all governmental research would be exerted, but that there is an opportunity in this field for beneficial correlation of effort.

The second group of scientists and technical men to be considered are in the research laboratories of industrial organizations. There are over two thousand such laboratories, large and small, and their work is of great importance, particularly in view of the growing tendency in this country among large industrial laboratories to carry on research of a fundamental scientific nature and to publish the results.

During the war these industrial laboratories have been of great importance in the development of weapons, working under contracts with the Army, the Navy and the Office of Scientific Research and Development. As far as the latter is concerned I can testify that we have had effective cooperation from the group at every point, that they have accomplished results of great importance, and that with negligible exceptions they have decidedly placed the interests of the country first and have not allowed their commercial interests to interfere with their contributions to the general cause. I have already discussed the provisions of the bill that would alter in several ways the relationship of these laboratories to government in the prosecution of research on new weapons during the war, and I have noted that I do not feel that new legislation is needed for this purpose.

The position of this group of scientists under the bill during the post-war period is hence the primary point for consideration. As I interpret the bill, they would not be greatly affected because most of the clauses which would alter their relationships are limited to the duration of a state of war. Presumably, the funds of the new office would be used, in times of peace, either to construct and operate new governmental laboratories or to utilize the facilities of existing laboratories under contract. While some industrial units might elect to operate their laboratories in that way, the chances are that in time of peace most industrial units would not wish to perform any substantial amount of their scientific work under government contract, especially considering some of the provisions in S. 702 concerning patent rights. Furthermore, I doubt if these industrial laboratories would accept in peace-time contracts consistent with the OSRD nonprofit theory as applied to research and development contracts. The alternative of including a large profit under the contracts, in the attempt to enlist the voluntary participation of these laboratories in a peace-time plan, is certainly not an attractive procedure.

As a matter of general policy, I do not believe that it would be wise for government to attempt to control the operations of these industrial laboratories, as might possibly be implied in the purpose specified in Section 1 (4), although presumably not within the scope of the powers and duties that would be given the new office. The industrial laboratories form an integral part of the industries with which they are associated, and form a part of the mechanism by which units in a single industry, and entire industries, compete with one another. Moreover, their particular part in such competition is directed explicitly toward the provision of better products for public consumption. The maintenance of such an atmosphere of competition, as opposed to close government regulation of monopolistic combinations engaged in manufacturing the products which the public needs, has been the philosophy behind a large amount of legislation during the past generation, and I believe that such a philosophy is in the public interest. Undoubtedly our laws regarding trade combinations can be improved,

or at least clarified, in order to render the system more fully beneficial, but the general idea of having various units in an industry competing on the basis of which one can supply the public with the best goods at the lowest cost, is hard to improve upon in theory, and in general it has worked well in practice wherever it has been truly operative. The industrial laboratories are an essential part of this process, and I feel that they should be subjected to as little centralized control as possible.

That brings us to a consideration of the proposed post-war effects of the bill on the third class of scientists; namely, those in universities and non-profit independent scientific institutions, and it seems to me that this group may be primarily affected.

In time of war it seems to me that the public interest demands that this group should be closely organized in order to apply their accumulated scientific knowledge to the direct needs of the Armed Services for developing new weapons and equipment and for meeting the needs of military medicine, and this organization has been accomplished by the Office of Scientific Research and Development, a war agency. Although such organization is necessary in time of war, it seems to me that in time of peace the scientists in this group should be given a maximum of freedom and a minimum of control from any source. Therefore, I think that it would be a mistake to attempt to control their activities through a Federal agency.

Of course, in view of the fact that many private institutions may be unable to finance an appreciable amount of scientific research activity after the war, it may be advisable or even necessary for such institutions to look to the federal and state governments for financial support. Our past experience in this country has shown us that it is possible for such governmental financial support to be given without being attended by stifling control, but the factual situation may be different after this war. For example, it seems to me that the high scientific standards of which quite a few state-financed institutions can be proud are attributable in no small part to the fact that up to the present time such institutions have been competing against privately endowed institutions with exceptionally high standards which were in a position to attract very outstanding scientists who felt that their efforts in state institutions were too closely controlled. If such competition is still present after the war, I can foresee many advantages and few disadvantages of federal financial support of the research activities of scientists in universities; if, however, there is no such strong competition, we must be careful lest federal financial support carries with it features of undesirable control.

Thus, I think that federal subsidy of the independent science of universities and other institutions in this country may be beneficial, and it may in fact be necessary in the years to come if we are to preserve that preeminence in science as a nation which is essential to our progress. But, unless we have the wisdom to extend support wisely, it may do much more harm than good. If federal support is to be given, strenuous efforts will be necessary to ensure that it furthers the work of the best and most brilliant scientific minds, and does not merely increase the bulk of mediocre work. And the support should be divorced from governmental control of the scientists and laboratories themselves, or it will stifle rather than expedite their true accomplishments.

The presence of a great body of highly able scientific men in this country has recently been an indispensable asset in time of danger. We must be sure that it is again present if we are again threatened, and science of the highest type flourishes best when it seeks its own objectives and pursues its own uninhibited ways. If we perpetuate in this country in the years to come a scientific atmosphere and body of men of the caliber that we now have, I will fear no threat from any source, for in time of need they will again respond, they will again direct their full energies in a patriotic effort, working under a closely unified and controlled program of the application of science in the prosecution of war, and they will thus do their full part in the protection of this country.

In conclusion, I wish to point out that there is another aspect of this whole subject of the furtherance of science. It extends beyond the mere application of the fruits of science to improve the comfort of the people, and it is on a more fundamental basis even than the safety of the country to external danger. The broad object of science is to increase the knowledge and the understanding of man. It aims at extending his grasp of the environment in which he lives, and his appreciation of the vast and intricate system of nature by which he is surrounded, from the study of the remote stars to the constitution of the smallest atom. We need science for this as well, so that as we live we may derive satisfaction by growing in knowledge.

Since after many years I have come to the realization that science flourishes to the greatest degree when it is most free, I feel strongly that, when peace comes, we should bend our efforts, not to perpetuate any of the necessary wartime controls which we have created for our defense, but rather to return the maximum of independence to our scientific institutions and our scientific men, wherever they may be located.

OBITUARY

RECENT DEATHS

DR. RUSSELL H. CHITTENDEN, emeritus professor of physiological chemistry of Yale University, director of the Sheffield Scientific School for twenty-four years, died on December 26 in his eighty-eighth year.

DR. JAMES HENRY KIMBALL, principal meteorologist of the U. S. Weather Bureau in New York, died on December 21. He was in his seventieth year.

HENRY LEVI WARD, director of the Neville Public Museum at Green Bay, Wis., previously for eighteen years director of the Milwaukee Public Museum, died on December 17 at the age of eighty years.

DR. WILLIAM H. KELLY, until his retirement two years ago chief veterinarian for New York State and veterinarian to the State Department of Agriculture, died on December 19. He was seventy-five years old.

SCIENTIFIC EVENTS

THE ENTOMOLOGICAL SOCIETY OF AMERICA

THE thirty-eighth annual meeting of the Entomological Society of America was held at the Deshler-Wallick Hotel, Columbus, on December 7, 8 and 9. The program was arranged jointly by the Entomological Society of America and the American Association of Economic Entomologists which met at the same time and place. The general theme of the program was "Entomology and the War." Approximately half the program centered around the subtopic of "Medical Entomology in Wartime" and the other half on "Agricultural Entomology in Wartime." Personnel of the United States Army, the United States Navy and the U. S. Public Health Service took part and discussed the importance of medical entomology in maintaining the health of members of the armed services. The Royal Canadian Army Medical Corps was also represented.

The annual public address and the entomologists' dinner were omitted this year in order to devote all the available time to the topics of the program. Approximately 300 persons were in attendance.

Officers of the society for the year 1944 are: Clarence E. Mickel, University of Minnesota, St. Paul, *President;* Roger C. Smith, Kansas State College, Manhattan, *First Vice-president;* W. J. Brown, Entomological Branch, Department of Agriculture, Ottawa, *Second Vice-president;* and Herbert H. Ross, Illinois State Natural History Survey, Urbana, *Secretary-Treasurer.*

THE AMERICAN SOCIETY OF TROPICAL MEDICINE

THE thirty-ninth annual meeting of the American Society of Tropical Medicine was held in Cincinnati on November 16, 17 and 18. The society met as the guest of the Southern Medical Association and conjointly with the American Academy of Tropical Medicine and the National Malaria Society. Thirty-eight scientific papers were presented.

The eighth Charles Franklin Craig Lecture was given by Colonel George C. Callender, of the Army Medical Center, Washington, D. C.

There was a symposium on War and Post-War Tropical Medicine, with Dr. L. T. Coggeshall, of the University of Michigan, presiding. Those participating included Alfred R. Crawford, Brooklyn, N. Y.; Drs. Henry E. Meleney, New York; George W. Hunter, III, Washington; A. C. Reed, San Francisco; Robert W. Huntington, Jr., San Diego; Robert L. Usinger, Savannah; Charles E. Williams, New Orleans, and W. A. Sawyer, New York, N. Y.

The president's address by Dr. N. Paul Hudson, entitled "A Broader Perspective for Bacteriology," was given at the annual luncheon. Following the address, ceremonies commemorating the fortieth anniversary of the society were held. A silver vase was presented to the editor of the *Journal* of the society, Colonel Charles F. Craig, in appreciation of his outstanding service. Dr. E. C. Faust then presented a paper entitled "The American Society of Tropical Medicine: A Biographical Sketch of the First Forty Years."

The society, joined by members of the American Academy of Tropical Medicine and representatives of the American Foundation of Tropical Medicine, met in special session to consider the responsibilities and opportunities of service in tropical medicine in the present war emergency and in the immediate future. It was proposed that the society suggest to suitable organizations the need for education and research in the field of tropical medicine, especially as pertains to civilian physicians in the post-war period.

Dr. Norman H. Topping, of the National Institute of Health, was presented with the Bailey K. Ashford award "for outstanding work in the field of tropical medicine."

Hospitality group sessions were held on November 16 and 17. At the first session, a brief discussion was presented by Lieutenant Colonel Thomas T. Mackie on "Reciprocal Inter-American Relationship." At the second session, Dr. E. Harold Hinman described

the work of the Department of Inter-American Affairs in Latin America with especial reference to Venezuela.

The attendance at all sessions of the thirty-ninth annual meeting was the largest in the history of the society.

THE NEW YORK ACADEMY OF SCIENCES

THE one hundred and twenty-sixth annual meeting of the New York Academy of Sciences was held on December 15. Dr. Horace W. Stunkard, of New York University, delivered the address of the retiring president. His subject was "How do Tapeworms of Herbivorous Animals Complete Their Life Cycles?" Vilhjalmur Stefansson spoke on "The Arctic Mediterranean." As already announced in SCIENCE, Dr. Duncan A. MacInnes, a member of the Rockefeller Institute for Medical Research, was elected president of the academy.

Honorary life members were elected as follows: Professor Alexander Fleming, of the University of London and the Royal College of Surgeons, discoverer of penicillin; Sir Frederick Gowland Hopkins, of the University of Cambridge; Professor The Svedberg, head of the Institute of Physical Chemistry, and Professor Arne Tiselius, biochemist, both of the University of Uppsala; Dr. Oswald T. Avery, bacteriologist, a member of the Rockefeller Institute, and Dr. Alfred L. Kroeber, director of the Museum of Anthropology of the University of California.

A. Cressy Morrison prizes of $200 each for papers selected from eight submitted in competition were awarded to Dr. William Augustus Ritchie, archeologist of the Museum of Arts and Sciences at Rochester, N. Y., for his study of "aboriginal cultures in New York State prior to the dominion of the Iroquois tribes"; and to Dr. Arnold Grobman, of the University of Rochester, for his paper on the "Distribution of Salamanders of the Genus Plethodon in the Eastern United States and Canada."

THE INSTITUTE OF RADIO ENGINEERS

THE Institute of Radio Engineers will hold its 1944 winter technical meeting at the Hotel Commodore, New York City, on Friday and Saturday, January 28 and 29.

Hubert M. Turner, associate professor of electrical engineering at Yale University, has been elected president of the institute. He succeeds Dr. Lynde P. Wheeler, of the Federal Communications Commission.

The meeting will be devoted to the domestic, international and war aspects of radio and electronic engineering. In addition to technical papers, the program will contain several features, including participating activities by the Federal Communications Commission, a display of captured enemy radio equipment and a discussion on the newly formed Radio Technical Planning Board.

Arrangements have been made with the American Institute of Electrical Engineers for a joint evening meeting on Thursday, January 27, to be held in the auditorium of the Engineering Societies Building. Major General R. B. Colton, of the Signal Corps, will talk about enemy communication equipment and will display some of the captured apparatus. This equipment will be at the Hotel Commodore on Friday afternoon, January 28.

The American Institute of Electrical Engineers is holding its technical meeting during the week of January 24, and, for the convenience of members of the Institute of Radio Engineers who desire to attend, their papers will be concentrated during the afternoon session of January 27.

Each year the Institute of Radio Engineers recognizes outstanding achievements in the field of radio communication by the bestowal of two awards. One recognizes, in general, an extensive service over a period of years, while the other is usually conferred for a more recent contribution.

The Institute Medal of Honor is given in recognition of distinguished service in radio communication. It is awarded to one who has been responsible for an important advance in the science or art of radio communication. This advancement may be a single development or it may be a series of developments which in the aggregate have resulted in substantial improvements in radio communication.

The Morris Liebmann Memorial Prize, to perpetuate the memory of the late Colonel Morris N. Liebmann, is made possible through the generosity of E. J. Simon, a fellow of the institute. The award consists of the income from a gift of $10,000, and is not a stated amount, as it is the interest from the securities in which the principal is invested. The recipient is a member of the institute and has made public during the recent past an important contribution to radio communications.

At this meeting the 1943 Medal of Honor will be presented to Haraden Pratt and the 1943 Morris Liebmann Memorial Prize to W. L. Barrow.

THE FIFTIETH ANNIVERSARY OF THE ARMY MEDICAL SCHOOL

THE Army Medical School, founded in 1893 by Surgeon General George M. Sternberg, marked its fiftieth anniversary at the graduation exercises of the sixteenth class in military and tropical medicine on December 18. Major General Shelley U. Marietta introduced Major General Norman T. Kirk, the Surgeon General of the Army, who gave the address. Certificates were presented to the class of one hundred and

twenty-four by Colonel Richard P. Strong, director of tropical medicine of the school, assisted by Lieutenant Colonel Thomas T. Mackie, the executive officer of the course. Graduates of this class included officers of the United States, Canadian and Peruvian armies and officers of state health departments.

Colonel G. R. Callender, director of the Army Medical School, presided. A simple ceremony commemorating the fiftieth anniversary honored Colonel Deane C. Howard, U. S. A., retired, who ranked No. 1 in the first class to graduate. Members of the faculty signing this diploma were Assistant Surgeon General G. H. Alden, first officer to command the school; W. H. Forwood and John S. Billings, deputy surgeons general; Charles Smart and Walter Reed, surgeons, and J. M. Cabell, assistant surgeon. Colonel Howard has had a distinguished career in the Medical Corps of the Army and was the chief of the Division of Sanitation in the Office of the Surgeon General in World War I. It was announced that a brochure covering the history of the school is being prepared.

OFFICERS OF THE AMERICAN CHEMICAL SOCIETY

DR. CARL SHIPP MARVEL, professor of organic chemistry at the University of Illinois, has been elected president of the American Chemical Society for 1945. He will take office as president-elect on January 1, when Dr. Thomas Midgley, Jr., vice-president of the Ethyl Corporation, becomes president, succeeding Dr. Per K. Frolich, director of the Chemical Division of the Esso Laboratories of the Standard Oil Development Company, Elizabeth, N. J. The new president-elect was chosen by the council from four nominees receiving the largest number of votes in a national mail ballot of the approximately 40,000 members of the society.

Dr. Robert E. Wilson, of New York, president of the Pan American Petroleum and Transport Company, and Professor Roger Adams, head of the department of chemistry of the University of Illinois, were elected directors of the society. Dr. Ernest H. Volwiler, of Abbott Laboratories, Chicago, was named director at large.

The following councilors at large were chosen: Dr. Henry B. Hass, Purdue University; Dr. Joel H. Hildebrand, University of California; Dr. Gustav E. F. Lundell, National Bureau of Standards, Washington, D. C.; Dr. Linus C. Pauling, California Institute of Technology.

Dr. Marvel was recently awarded the 1944 William H. Nichols Medal of the New York Section of the American Chemical Society, one of the highest distinctions in chemical science. It is conferred annually to stimulate original research in chemistry. The presentation will be made at a meeting of the New York Section on March 10.

Dr. Marvel was cited for outstanding organic chemical contributions to the structure of vinyl polymers, used as synthetic plastics, particularly in the production of transparent aircraft pieces; as rubber substitutes and as thickening and blending agents in the chemical manufacturing industry. The citation also stressed the importance of his research in the structure of polymers of sulphur dioxide and olefines.

Dr. Marvel has carried out notable investigations in the fields of synthetic and structural organic chemistry, including the development of practical methods for preparing amino-acids, which are becoming increasingly important in the preparation of synthetic diets for intravenous feeding. Other studies have dealt with the relationship of hydrogen bonding and solubility behaviors, which forms the basis for one method of electrical refrigeration operating at low pressure, minimizing explosion hazards; the identification of organic compounds; the effect of structure in hexaarylethanes; the synthesis and rearrangement of polyines and polyynes and the organo-metallic compounds.

AWARD OF THE EDISON MEDAL TO DR. VANNEVAR BUSH

DR. VANNEVAR BUSH, president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development of the Office of Emergency Management, Washington, D. C., has been awarded the Edison Medal for 1943 of the American Institute of Electrical Engineers. The award goes to Dr. Bush "for his contribution to the advancement of electrical engineering, particularly through the development of new applications of mathematics to engineering problems, and for his eminent service to the Nation in guiding the war research program." The medal will be presented on January 26 at a general session of the winter technical meeting of the institute in the Engineering Societies Building, New York, N. Y.

The Edison Medal was founded by associates and friends of Thomas A. Edison and is awarded annually for "meritorious achievement in electrical science, electrical engineering or the electrical arts" by a committee of the American Institute of Electrical Engineers.

Dr. Bush joined the faculty of the Massachusetts Institute of Technology in 1919 as associate professor of electric power transmission, and became professor in 1923. He was appointed vice-president and dean of the school of engineering, Massachusetts Institute of Technology, in 1932. He has been president of

the Carnegie Institution of Washington since 1939. In 1942 he was appointed chairman of the joint committee on new weapons and equipment of the joint U. S. chiefs of staff, and is a member and former chairman of the National Advisory Committee for Aeronautics.

Dr. Bush is known for his development of mathematical analyzing instruments for solving complex equations in science and engineering. The most notable of these is the differential analyzer, which greatly increases the range of engineering calculations in the field of differential equations.

SCIENTIFIC NOTES AND NEWS

AT the December convocation of the University of Pennsylvania, the doctorate of laws was conferred on Dr. Edwin G. Conklin, professor emeritus of biology at Princeton University and president of the American Philosophical Society. The doctorate of science was conferred on Brigadier General James S. Simmons, chief of the division of preventive medicine of the Office of the Surgeon General.

DR. LUDVIG HEKTOEN, executive director of the National Advisory Cancer Council and chairman of the Chicago Cancer Committee since its organization in 1941, has been reelected chairman.

THE council of the British Institution of Naval Architects has conferred honorary membership on Thomas Henry Havelock, F.R.S., professor of mathematics and head of the department at King's College, Newcastle, in recognition of his work on hydrodynamics and its application to ship wave resistance.

THE United Press reports that Professor Lennart von Post, the Swedish geologist, has returned an honorary doctor's degree awarded to him two years ago by the University of Königsberg as a gesture of protest against Nazi tactics in Norway.

DR. EMMA PERRY CARR, head of the department of chemistry at Mount Holyoke College, has been appointed to a visiting professorship at the Institute of Chemistry of the University of Mexico during the months of January and February. The invitation to collaborate with leading Mexican chemists on a research project was extended through the Cultural Relations Division of the State Department.

DR. C. E. CLARK, assistant professor of mathematics at the Bradley Polytechnic Institute, has been appointed to an associate professorship at Emory University.

DR. SIDNEY W. FOX, research chemist with the F. E. Booth Company, Albany, Calif., has become assistant professor of chemistry and chemist in the sub-section of plant chemistry of the Iowa Agricultural Experiment Station.

DR. CHARLES M. BREDER, director of the New York Aquarium, until its closure and its transference to the New York Zoological Park on October 4, 1941, has been appointed curator of the department of fishes of the American Museum of Natural History. Since 1926 he has served as research associate in ichthyology at the museum. Dr. Breder served the New York Aquarium and the New York Zoological Society for twenty-two years, having been made director of the aquarium in 1937. Christopher W. Coates, a member of the staff of the aquarium, has been appointed curator of fishes at the Zoological Park. Dr. Myron Gordon, also a member of the staff of the aquarium, has been made assistant curator.

Chemical and Engineering News reports that Dr. John D. Clark, head of the department of chemistry of the University of New Mexico, has leave of absence to become associated with the Institute of Chemistry of the National University of Mexico, Tacuba. He will direct research, teach and conduct a seminar at the Benjamin Franklin Library and will be an employee of the Department of State.

C. L. WARWICK, secretary-treasurer of the American Society for Testing Materials, has resigned as chief of the Materials Branch of the War Production Board in order to give more time to the work of the society. He plans, however, to devote half his time as consultant to the conservation division of the board. He will continue as administrator of the National Emergency Steel Specifications Project, and he will be chairman for the division of the advisory committee on conservation in construction.

DR. H. L. COCHRAN, from 1935 to 1943 associate horticulturist in charge at the Georgia Agricultural Experiment Station, has been appointed horticulturist in charge of the production of raw products for Pomona Products Company of Griffin, Ga. He will be responsible for research on canning crops.

DR. SIDNEY WEINHOUSE, of the University of Chicago, has become associated with the Houdry Laboratories of the Catalytic Development Corporation of Marcus Hook, Pa.

DR. W. H. STARK, superintendent of the Butyl Alcohol Plant of Asociación Azucarera Cooperativa Lafayette, Arroyo, Puerto Rico, has resigned to become director of research with Joseph E. Seagram and

Sons, Inc., Louisville, Ky. He expects to take up his new work by January 1.

DR. GEORGE L. KREEZER, assistant professor at Cornell University, has received leave of absence to join the staff of the radiation laboratory of the Massachusetts Institute of Technology.

DR. HELGI JOHNSON, associate professor of geology at Rutgers University, recently returned from Newfoundland, where he carried on strategic mineral and geological surveys for the Government of Newfoundland in an attempt to alleviate the shortage of important war materials.

DR. WILLIAM MCDOWELL HAMMON, assistant professor of epidemiology at the School of Medicine of the University of California, chairman of the curriculum for tropical medicine, has returned to the university from a leave of absence spent in studying tropical medicine in Costa Rica, Panama and Guatemala.

FOUR members of the department of geology of the University of California at Los Angeles have leave of absence to assist the U. S. Geological Survey in its search for strategic minerals needed for the war effort. Professor James Gilluly is engaged in an investigation of copper resources; Dr. M. N. Bramlette is helping in the oil exploration program, and Dr. Cordell Durrell is conducting a search for optical quartz and calcite. Dr. Wm. C. Putnam is attached to the Washington offices of the survey. In addition fifteen graduates of the department are participating in the work. Headquarters have been set up at the university for work on the oil problems of California under the direction of Dr. W. P. Woodring, geologist of the survey.

ACCORDING to the *Alumni Bulletin* of Harvard University, a medical expedition organized by the department of tropical medicine of the Harvard Medical School and the School of Public Health, in collaboration with the American Foundation for Tropical Medicine, has flown to Liberia to study the spread and control of African sleeping sickness. The expedition will remain in the field for at least six months to make a study of the tsetse fly. Dr. Joseph C. Bequaert, assistant professor of comparative pathology and tropical medicine and associate curator of insects at the Museum of Comparative Zoology, will study the fly. Dr. David Weinman, instructor in comparative pathology and tropical medicine, will investigate the trypanosome, causative agent of the disease, and will attempt to develop new methods of diagnosis and control. Dr. Everett P. Veatch, of Pasadena, Texas, medical officer on the Firestone rubber plantations, will concern himself with the treatment of the disease by accepted therapeutic procedures and will cooperate in assaying new chemotherapeutic agents.

DURING October and November Dr. H. S. Jennings, emeritus professor of zoology of the Johns Hopkins University, gave at Indiana University the Patton Foundation lectures. His subject was "Problems of Life, Age and Death in One-Cell Animals."

THE eighth Charles Franklin Craig Lecture of the American Society of Tropical Medicine was delivered at the meeting of the society in Cincinnati on November 16 by Colonel Geo. R. Callender, M. C., director of the Army Medical School. The lecture was entitled "The Diarrheal Diseases."

DR. EDWIN G. CONKLIN, professor emeritus of biology of Princeton University, will make an address entitled "Ends as Well as Means in Life and Evolution" at a joint meeting of the Section of Biology and the Section of Psychology of the New York Academy of Sciences, to be held on January 17 at 8 o'clock P.M. at the American Museum of Natural History.

DR. ESTHER ROSENCRANTZ, associate professor emeritus of the University of California, on November 18 gave an address on "Sir William Osler" before a combined meeting of the Los Angeles County Medical Association and the Barlow Society for the History of Medicine. Many rare items from the Osler collection in the Crummer Library, combined with items from the Los Angeles Medical Library, made a large and interesting Osler collection, which was exhibited at the meeting. Dr. George Dock, who was one of Dr. Osler's colleagues during the Pennsylvania period, gave an account of a journey that he had made with Dr. Osler in search of rare books.

DR. HERBERT C. CLARK, director of the Gorgas Memorial Laboratory in Panama, who was invited by the National Research Council to visit medical schools throughout the United States, recently gave a series of lectures at the School of Medicine of the University of California at San Francisco.

THE University of Rochester will begin a weekly radio series on January 1, entitled "Time for Science." The programs will be given in cooperation with the magazine *Time* and the Stromberg-Carlson Station WHAM, of Rochester, N. Y. They will present "a realistic interpretation of the effects of scientific advances on everyday living." Dr. Gerald Wendt, science editor of *Time*, will direct the broadcasts, which will be on Saturdays from 7:30 to 8 o'clock P.M.

ACCORDING to the *Journal* of the American Medical Association, the board of trustees of the Cleveland Clinic Foundation has given a fund of $50,000 to the School of Medicine of Western Reserve University,

the income to be devoted to surgical fellowships for accredited postgraduate students chosen by the faculty of the School of Medicine. The fund is named for Drs. Frank E. Bunts, George Crile and William E. Lower, who founded the clinic in 1921.

THE department of pharmacology of the College of Medicine of Wayne University is the recipient of a grant of $6,000 provided by Frederick Stearns and Company for a two-year study of the pharmacological actions of methyl cellulose.

A RESEARCH fund to finance studies of diseases of the mouth has been established at the College of Dentistry of New York University, of which Dr. Allen T. Newman is dean. The contributors include graduates of dental colleges here and abroad who have taken postgraduate work in periodontia at New York University and who wish to further that branch of dentistry. Dr. S. M. Robbins, of Cleveland, is chairman of the fund committee. The research will be under the direction of Professor Samuel Charles Miller. Studies of the efficacy of various dentifrices, causes of mouth diseases and an inquiry into the incidence of trench mouth will be undertaken.

Chemical and Engineering News reports that officials of the War Production Board have indicated that production of penicillin will be multiplied fifty-five times by March 1, and that the price will again be substantially lowered. Nineteen companies are now in production, but relatively little of the full capacity will be available until early in 1944. The volume of production is still a secret, but ultimately authorizations granted by WPB will result in quantities ranging from 400,000,000 units per month from some smaller laboratories to 20,000,000,000 from large chemical producers.

THE Atlas Powder Company has established a central research laboratory near Wilmington, Del., for expansion of research work for the war programs. Dr. R. S. Rose, Jr., director of the Atlas laboratory at Reynolds, Pa., will be placed at the head of the new central laboratory, the first unit of which is nearing completion. The new laboratory will be devoted chiefly to the development of organic compounds for industrial uses.

THE United States Steel Corporation has announced that its subsidiary, the Oliver Iron Mining Company, plans to establish an iron-ore research laboratory at Duluth, Minn., to enable it to continue its work on the improvement of the Lake Superior district iron ores.

A TELEPHONE message sent from Stockholm to *The New York Times* on December 11 reports that the Germans in Denmark have confiscated the Institute for Theoretical Research in Physics, the center for atomic research which was directed by Professor Niels Bohr until his recent escape to Great Britain. Dr. Boeggild and Herr Olsen, his chief assistant, who with their families live at the institute, were arrested and taken to a prison in Copenhagen. After the confiscation the dean of the University of Copenhagen was ordered to sign a letter agreeing to the requisition.

A UNITED PRESS dispatch states that the Uruguayan Government has accepted a $500,000 gift from the U. S. Office of Coordination of Inter-American Affairs to be devoted to sanitation work and health measures. Similar gifts have been made to other Latin-American countries out of a special fund in the coordinator's office that is disbursed not as a loan but as an outright gift.

DISCUSSION

GIGANTIC DRYING CRACKS IN ANIMAS VALLEY, NEW MEXICO[1]

SOME years ago there was brought to my attention a strange-looking polygonal pattern resembling drying cracks that appeared on aerial photographs of the playa of Animas Valley in southwestern New Mexico. Estimates made from the photographs of the probable size of the polygons gave such surprisingly large results as to raise doubt that they could be drying cracks. The writer requested the Army Air Force to photograph the area to provide additional material for study. This they did most effectively and kindly furnished an abundant series of vertical and oblique pictures. It was evident from these pictures that the pattern was not transient and it was inferred that the dark boundaries surrounding the light-colored polygons must be some very substantial feature upon the surface of the playa.

Subsequently the writer made three brief, but in time, widely spaced (1937–1941) examinations of the surface of the playa where the pictures indicated well-developed patterns. The first attempt proved disappointing and the investigation was partly hampered by a sheet of water from recent rains which then covered the playa. Nothing remotely resembling the striking pattern seen on the aerial photographs could be found on the playa at that time. The second visit proved more fruitful. By precisely locating a position on the ground with reference to its counterpart on the picture a faint trace was discovered which when

[1] Published by permission of the Director, U. S. Geological Survey.

followed through proved to be the margin of a polygon. The polygons thus identified were of enormous size averaging 80 to 90 feet in diameter. An uninformed person walking upon the playa would never suspect their presence; the only physical mark upon the surface is a broad faint depression more or less straight and trench-like, averaging 3 feet wide and perhaps an inch or more deep in the middle. Each side of a polygon is a line of fracture and fill which could not be recognized from the air were it not for a concentration of vegetation along these faint grooves. Here, either because of better-growing conditions or the more abundant lodgment of seeds, the plants *Suaeda fruticosa* Forsk., with fleshy leaves of a purplish color, and *Atriplex acanthocarpa* (Torr.) Wat., having fuzzy white leaves and bur-like fruits, are concentrated in greater numbers than upon the areas of the polygons and thus form the black borders which are so effective in outlining the polygons. Both plants are bushy and grow about a foot high. This geologic feature might have remained unnoticed were it not for the striking pattern made by the plants as seen from the air.

The year 1934 was one of extreme but brief drought in southern New Mexico. Inquiry disclosed that at least one resident of Animas Valley had remembered seeing that year open fractures on the parched playa. His recollection was that the openings were narrow but may have been two or three feet deep. They were subsequently filled by collapse and inwash of surface material.

The pattern is probably old, and the ground undoubtedly has suffered repeated opening and filling with every severe drought. But why these polygons have formed on such a grand scale is a point of interest which will be enlarged upon at a more propitious time.

WALTER B. LANG

U. S. GEOLOGICAL SURVEY

POLLEN RECORD OF CANADIAN SPRUCE AND FIR FROM TEXAS BOG

A PRELIMINARY pollen analysis of the deep peat deposit (22 feet) in Patschke Bog, Lee County, Texas, gave very significant records on former ranges of boreal conifers and Castanea in North America.

Patschke Bog is an old lake, perhaps of the meander type, now filled completely with peat, which rests on fine reddish sand. The peat is extremely black and consists chiefly of finely divided wood fragments. The preliminary pollen study indicates a history of the vegetation showing the following changes in composition: Spruce-pine-oak-grasses, to oak-grasses, to grasses, to alder, to chestnut-alder, to chestnut-oak-grasses, to oak-grasses. The most significant discovery is a record of upward to 5 per cent. of Canadian spruce and fir pollen in the lower five foot-levels. Castanea attained a pollen representation of 33 per cent. at the 8-foot level, and 30 per cent. at the 6-foot level.

This pollen record shows former distribution of Castanea to have been at least one hundred miles westward of the present range limits, and of spruce and fir approximately 800 miles southward of Bacon's swamp, Indiana, the present southernmost profile showing the former range of these genera.

It seems probable that the hypothetical lake in Texas was occasioned by the blocking of a tributary to Yegua Creek. Abundant seep springs now feed the bog with water from under the adjacent hill slope.

The Patschke Bog is located in the Carrizo formation, the lowest member of the Claiborne group, near the middle of the Eocene system. The mineral content consists of about nine tenths medium-grained sands and one tenth sandy clay. Strata of impervious bluish-grey sandy shale occur at intervals, and, where erosion has exposed them, these result in seep lines of generally quite constant function, even during intense drought periods of several years' duration.

The topography is rolling, and the region is covered by a forest of which the dominants are post-oak, blackjack-oak and Buckley's hickory.

The bog itself was originally covered by a dense growth of *Ilex vomitoria* Ait., *Myrica cerifera* L., and *Quercus nigra* L., with *Erianthus saccharoides* Michx., Panicum spp., *Andropogon glomeratus* (Walt.) BSP., many species of sedges, *Osmunda cinnamomea* L., *O. regalis* L., *Anchistea virginica* (L.) Presl., Lycopodium sp., *Sphagnum subsecundum* Nees., *Rhexia mariana* L., *Pogonia ophioglossoides* (L.) Ker. as representative of the herbaceous flora. *Nyssa sylvatica* Marsh and *Ilex opaca* Ait. reach their southwestern limits along the margins; while the only collection of *Marchanlia polymorpha* L. on record for Texas was made from a burned area in the vicinity.

J. E. POTZGER

BUTLER UNIVERSITY

B. C. THARP

UNIVERSITY OF TEXAS

A FORGOTTEN FACTOR IN CARDIAC PHYSIOLOGY

As the result of experience in the devising and use of mechanical hearts,[1] quite naturally my attention has been focused on the mechanical properties of the physiological model. One of these has been utterly impossible to duplicate and, as the efficiency of the machine depends largely on this factor, its consideration becomes of prime interest.

[1] O. S. Gibbs, *Jour. of Pharmacol. and Exp. Therap.*, 35: 197, 1930; *ibid.*, 49: 181, 1933.

The function to which I refer is the amazing ability of the heart to handle large, variable streams through markedly angular passages, at vastly different pressures and rates varying from zero to high speed, without provoking therein measurable eddies. Quite an elementary knowledge of engineering teaches us that the onset of eddies in either inlet or outlet ducts is associated with a material drop in efficiency. As the velocities increase, the production of eddies may be so great that finally they themselves may put a top level at which the system may function. Moreover, there are two different ways in which this may occur. On a low pressure induction system, the top rate of the entry stream may be easily and finally limited, while on the high pressure outflow side, the effects may also be similar where limited power is available or, alternatively, markedly increase the energy consumption per unit of flow.

In the living heart, eddies on the very low pressure flow side could very easily cause obstruction leading to acute or chronic venous congestion. On the outflow sides, the development of such eddies would be most importantly connected with a limitation of the total output, both immediately and secondarily, by the onset of unusual cardiac fatigue.

There seems little doubt that this function is associated with at least three factors, namely, the curious arrangements of the muscular bundles; the pattern of the nervous discharge; and the properties of the blood itself. It is also conceivable that the odd lining of the ventricles may have a damping effect on eddy formation. Moreover, it seems highly probable that this function is not entirely located in the heart itself, but is also carried out in the main vessels, especially the arteries where eddies would very greatly increase internal friction.

As eddies are readily discernible by stethoscope or other devices, their onset has many clinical notations. Those that are not occasioned by gross physical damage and tend to be variable in character are called haemic or organic murmurs. That changes in the blood may cause such eddies is known, especially by certain anemias, but it has not been generally recognized that their normal absence is due to a remarkable cardiac function which may itself become disturbed. Consequently, its full significance both in diagnosis and prognosis has been overlooked. Especially might attention be directed to the fact that increase in the loudness of murmurs by reason of increased work is a clear sign that the efficiency of the heart is materially decreased for such higher loading. Eddy formation in the large vessels would not be heard easily, as they are too deeply situated, but, by effectively decreasing the available flow space, they will load the heart with useless counter-friction work. The markedly decreased ability to compensate for loading by some arterio-sclerotics, in the absence of other obvious causes, may be such an example. The importance of eddies in flow systems is very well appreciated in engineering, including electrical, and it seems worth while to recall this neglected factor to students of the circulation, since it has yet to be incorporated in the standard works.

O. S. GIBBS

MEMPHIS, TENN.

A CATALOGUE OF INSECTICIDES AND FUNGICIDES

FOR the past year we have been engaged in surveying the literature and cataloguing all materials which have been tested for insecticidal or fungicidal properties. In our opinion such a compilation will be valuable to research workers and students in the fields of agricultural chemistry, economic entomology and plant pathology, particularly since it will insure a minimum of duplication in any search for new materials. Apparently no catalogue of this nature has been prepared up to the present time.

Our search so far has yielded over 500 literature citations, from which approximately 5,000 individual insecticidal and fungicidal materials have been catalogued. It is obvious that the usefulness of such a catalogue will depend upon its completeness. While we have made every effort to cover the literature completely, there are undoubtedly journal articles, bulletins and other less widely circulated publications which have been overlooked.

In this connection, therefore, we are appealing to all workers in the fields mentioned to supply the undersigned with any unpublished data, reprints or literature citations dealing with insecticidal or fungicidal tests on specific materials, so that all such materials may be included in this catalogue. Particularly we would welcome lists of materials tested by industrial research laboratories, even though the results disclosed may be of a negative nature.

Information should include the name of the chemical compound, its formula, the name of the test organism and a general statement of toxicity. In the case of plant products, the scientific name as well as the portion of the plant used for the test should be included.

It is our intention to prepare this catalogue for publication as soon as possible. Because of the size of the undertaking, it may not be available for wide distribution, but each *bona fide* contributor will be assured of a copy. We shall be very grateful for any comments or suggestion.

DONALD E. H. FREAR

DEPARTMENT OF AGRICULTURAL
AND BIOLOGICAL CHEMISTRY,
THE PENNSYLVANIA STATE COLLEGE

THE GIANT SEQUOIA

APROPOS the current discussion in SCIENCE of taxonomists concerning the generic segregation and proper generic name of our western Sequoia they might reasonably be asked to shed some light on the following: Presl, in describing certain fossil cones from Bohemia, had what are undoubtedly the fossil cones of Sequoia. To these he gave the generic name Steinhauera in 1838, or nearly a quarter of a century before our western "big tree" was named. The citation is Presl in Sternberg's "Flora der Vorwelt," Band 2, Heft 8, p. 202, published at Prague. Sometimes it reminds one of the old printing adage that a compositor should follow copy even if it blew out of the window of the composing room.

EDWARD W. BERRY
THE JOHNS HOPKINS UNIVERSITY

SCIENTIFIC BOOKS

ORGANIC CHEMISTRY

Organic Chemistry. By C. W. PORTER and T. D. STEWART. 6×9 in. 577 pp. Bound in dark blue cloth, with cover lettering in red. The Athenaeum Press. Boston, New York, etc.: Ginn and Company. 1943. $4.00.

As the authors explain in their preface, this book is an outgrowth and further development of their previous text, "The Carbon Compounds," which was used by them for many years in the University of California as an elementary outline of the subject and passed through a number of revisions. Organic chemistry has expanded recently so rapidly and in so many important directions that they decided to write an entirely new book rather than to prepare a further revision of the older one. The result is an excellent one-year elementary course, which gives a good bird's-eye view of the field as a whole, discusses clearly and competently fundamental concepts and theories in the light of our present knowledge, and the important contributions of organic chemistry to our understanding of biological processes and to the rapid expansion of chemical industries. The authors emphasize throughout the book the rapidly growing correlation of organic with inorganic and physical chemistry.

The book can be used not only for a full-year course in the subject, but also, as is the case at the University of California, for a half-year sophomore course taken by students in chemistry, agriculture, medicine, dentistry and home economics, by the omission of certain portions of the text.

The arrangement of the material follows in the main the usual lines of aliphatic, alicyclic, aromatic and heterocyclic chemistry, except that "Proteins and Amino Acids" and "Optical Isomerism" are placed between the chapter on "Aromatic Acids and their Derivatives" and that on "Natural and Synthetic Dyes." The "Terpenes" follow the "Heterocyclic Compounds," as do the "Sterols" also, the latter being grouped with the "Vitamins and Hormones."

One of the features which appeals strongly to this reviewer is the amount of space devoted to the hydrocarbons, particularly those of the aliphatic group (50 pp.), for, after all, the hydrocarbons constitute the steel framework upon which the whole vast, multifarious and intricate structures of organic compounds are erected. Further, the chemical developments of the last few years have already ushered in an era of aliphatic chemistry, which seems destined to rival or surpass the great era of aromatic chemistry of recent decades. Fifteen years ago, as reported recently by Dr. H. B. McClure, only about a dozen aliphatic compounds were manufactured on a commercial scale. To-day, the Carbide and Carbon Chemicals Corporation alone is shipping at least 160 different ones, approximately 40 of which require tank car transportation.

A generalized preview of the field is provided in the introductory chapter and is followed by 25 chapters covering the major classes of organic compounds. Under the heading of "Supplementary Notes," further discussions are given of "Acids and Bases," "Catalysis by Acids and Bases," "Chemical Reactivity" and "Asymmetric Change." An appendix deals with the determination of formulas from the analytical results, of "Molecular Weights" from the properties of gases or of solutions, with "Vapor Pressure," "Boiling Point and Freezing Point," "Osmotic Pressure," "Bond Distances" and "Atomic Radii." A separate section (43 pp.) is devoted to "Questions and Problems," so arranged as to accompany the individual chapters of the text, and the volume closes with a good general index.

The book is heartily recommended, not only to beginners, but also to those older organic chemists who have not had the time to familiarize themselves with the various ways in which the concepts of physical chemistry have fundamentally altered many of the older interpretations of the physical and chemical behavior of the compounds of carbon. A perusal of even the introductory chapter will make this clear.

MARSTON TAYLOR BOGERT
COLUMBIA UNIVERSITY

THE ELECTRICAL INDUSTRY

The Rise of the Electrical Industry during the Nineteenth Century. By MALCOLM MACLAREN. Princeton University Press. 1943.

PROFESSOR MACLAREN throughout his long career as an electrical engineer in industry and as professor of electrical engineering at Princeton University has had many opportunities to associate with men who have contributed during the late nineteenth century to the development of the electrical industry. His opportunities for analyzing this development have been enhanced by his close association with the excellent collection of old instruments, including experimental models used by Joseph Henry, in the Princeton Electrical Museum.

Professor MacLaren states in his preface that he has described the development of the electrical industry in non-technical terms "in the hope that it may appeal to the general reader"; he has, however, inserted an extensive bibliography so that readers may inquire further into technical details. It is the opinion of the reviewer that the book will be most interesting to those readers who have a knowledge of the technical basis of electrical engineering. The author's brief reviews of the developments of various kinds of apparatus do not appear to be easy reading for a layman, although such brevity is to be commended from the point of view of the technically trained reader.

The early history of electricity is very briefly reviewed in the first chapter. Professor MacLaren then goes on to chapters devoted to the description of the development during the nineteenth century of communications, illumination, direct-current motors and generators, measuring instruments, direct-current distribution systems and early developments of alternating currents. These chapters present clearly and concisely the facts related to each subject. The value of the text is further extended by more than 150 reproductions of photographs of specific pieces of apparatus. Many of these illustrations are photographs of experimental apparatus and of early commercial models of batteries, motors, generators, meters, control devices and switchboards. The value of these illustrations would be greatly increased if some means had been used in each case to indicate the linear dimensions of the apparatus.

Professor MacLaren has chosen to limit his discussion to the nineteenth century. This is perhaps necessary, because an adequate history of the development during the twentieth century could not have been compressed into a single volume. His plan, however, has brought about an interesting result; the reader is conducted through a fascinating story of the development of a particular electrical device up to the beginning of this century. This is the end of the chapter, so that the reader finds himself in the same state of mind as one who reads a serial novel and is forced to wait for another month to continue a particularly exciting episode.

It is quite probable that this book will be examined with great interest by historians of science. They will find not only a series of interesting facts treated briefly and objectively in the text, but they will also be stimulated to study the bibliography which Professor MacLaren has supplied, and find there the extensive literature to which such a bibliography naturally leads.

S. REID WARREN, JR.
MOORE SCHOOL OF ELECTRICAL ENGINEERING,
UNIVERSITY OF PENNSYLVANIA

SPECIAL ARTICLES

PURIFICATION AND CHARACTER OF THE SWINE INFLUENZA VIRUS[1]

RECENTLY, there were described the purification and characterization of the influenza viruses A (PR8 strain)[2] and B (Lee strain).[3,4] The influenza virus A was found to be a lipoprotein complex of rounded or ovoid particle shape and of variable size. The average diameter of the particles, as measured from electron micrographs, was 77.6 mμ. The sedimentation diagram revealed a slightly diffuse boundary moving at a rate corresponding to the constant $S_{20^\circ} = 724 \times 10^{-13}$, from which the particle diameter was calculated to be 80 mμ. The influenza virus B was somewhat similar in constitution and in appearance in electron micrographs, but the diameter of the particles, measured from electron micrographs, was 97.3 mμ and calculated from the sedimentation constant, $S_{20^\circ} = 832 \times$

[1] This work was aided by the Dorothy Beard Research Fund and by a grant to Duke University from Lederle Laboratories, Inc., Pearl River, N. Y. The investigation was also supported through the Commission on Acute Respiratory Diseases, Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army, Preventive Medicine Division, Office of The Surgeon General, United States Army, and by grants from the Commonwealth Fund, the W. K. Kellogg Foundation, the John and Mary R. Markle Foundation and the International Health Division of the Rockefeller Foundation to the Board for the Investigation and Control of Influenza and Other Epidemic Diseases for the Commission on Acute Respiratory Diseases.

[2] A. R. Taylor, D. G. Sharp, D. Beard, J. W. Beard, J. H. Dingle and A. E. Feller, *Jour. Immunol.*, 47: 261, 1943.

[3] D. G. Sharp, A. R. Taylor, I. W. McLean, Jr., D. Beard, J. W. Beard, A. E. Feller and J. H. Dingle, SCIENCE, 98: 307, 1943.

[4] D. G. Sharp, A. R. Taylor, I. W. McLean, Jr., D. Beard, J. W. Beard, A. E. Feller and J. H. Dingle, *Jour. Immunol.*, in press.

10^{-13}, was 100 mμ. Similar studies on the purification and character of the swine influenza virus are reported here.

The virus employed was an egg-adapted strain of swine influenza virus obtained from Dr. John F. Enders. A 10^{-3} dilution in hormone broth of virus-infected chorio-allantoic fluid was inoculated into the chorio-allantoic cavity of chick embryos of 11 days' incubation at 37.5 C. After 42 hours' further incubation at 37 C, the chorio-allantoic fluid was drawn off and spun in the angle centrifuge at 2,000 g for 10 minutes. Purification of the virus was then effected either by adsorption on and elution from chicken red blood cells followed by ultracentrifugation or by ultracentrifugation alone.

For the former, 200 ml of fluid were adsorbed with 6 ml of washed chicken red blood cells. Agglutination was strong and rapid, as was the case with influenza virus A. The massed red cells were sedimented, separated from the supernate and washed rapidly with chilled Ringer solution. Elution was carried out at 25 C in a volume of Ringer solution one fourth that of the starting chorio-allantoic fluid, and in contrast with the conditions favorable for elution of influenza viruses A[2] and B,[3,4] 6 hours were allowed for separation of the virus from the red cells. The eluate, freed of red cells, was spun in the ultracentrifuge at 20,000 g for 1 hour. The supernate was poured from the clear gel-like pellets, which were redispersed in Ringer-calcium chloride solution,[2] adjusted to pH 7.3 (with 0.01 N NaOH) at 150 times concentration with respect to the starting fluid. The concentrate was cleared of aggregates by spinning at 5,000 g for 5 minutes.

For purification of the virus by ultracentrifugation alone, the virus-infected chorio-allantoic fluid, after angle centrifugation, was put through two cycles of alternate high (20,000 g) and low (5,000 g) speed centrifugation similar to the single cycle employed for the eluate described above.

The infectious titer of the chorio-allantoic fluid varied from $10^{-7.3}$ to $10^{-7.8}$ and the hemagglutinative titer from 1–128 to 1–256. In the adsorption-elution process from 70 to 100 per cent. of the activity were carried into the eluate. In ultracentrifugation of the eluates, 50 to 80 per cent. of the hemagglutinative activity and 20 to 50 per cent. of the infectivity were recovered in the concentrates. The yield of activity in the concentrates of ultracentrifugation alone was about the same as that obtained when adsorption, elution and ultracentrifugation were carried out. In all instances, virus activity was associated with the concentrates obtained at 20,000 g.

The final pellets obtained by either procedure were clear, gel-like and could be quickly dispersed in Ringer-calcium chloride solution to give a bluish opalescent preparation. Preparations containing 0.28 mg nitrogen per ml sedimented in the analytical ultracentrifuge with a slightly diffuse boundary and at a rate corresponding to $S_{20^\circ} = 662 \times 10^{-13}$. From this constant and the density, 1.18, as determined by pycnometer measurement, the particle diameter was 81.5 mμ. Analyses made both by the adsorption procedure of Svedberg and by the scale method gave comparable results.

Examinations of the purified material in the electron microscope revealed images which were for the most part nearly round but in many instances were ovoid or bean-shaped, similar in appearance to those of influenza virus B. The particles in solutions of the concentrates showed a strong tendency to aggregate, especially in material sedimented at 27,000 g, the ultracentrifugal field employed in preliminary work with this virus. In individuals clearly shown, there was an internal structure of relatively high density. Wide variations were seen in diameter. From measurements on 1,051 images, the average diameter was 78.3 mμ.

Studies with the electron microscope were made also of the various fractions obtained in the purification process. In the crude chorio-allantoic fluid there was a profusion of small particles of about 20 mμ and less diameter, which were somewhat like those seen in the instance of influenza virus A[2] and wholly unlike the relatively large particles of variable size in the chorio-allantoic fluid infected with influenza virus B.[3,4] Interspersed with the small particles there were many larger particles of a size and appearance corresponding to the virus in the purified concentrates. Small particles, comparable in numbers to those seen in chorio-allantoic fluid, were present in the fluid after adsorption, but very few particles of about 78 mμ were visible. In the eluate, four times concentrated, many more of the large virus particles were seen amidst many of the small ones carried over in the adsorption-elution process. The appearance of the supernate after ultracentrifugation resembled that of the adsorbed fluid in the presence of many small particles and very few of the large ones. The final concentrates contained but few of the small particles.

The concentrates gave positive biuret, Millon and ninhydrin reactions, negative glyoxylic acid reactions and delayed, weakly positive Molisch tests. The reaction for pentose with Bial's reagent was negative after hydrolysis of the material with 10 per cent. sulfuric acid. This result, together with a weakly positive diphenylamine reaction, indicated the presence of nucleic acid of the desoxypentose type. The specific volume by pycnometer measurement was 0.850.

Analysis of the concentrates, dialysed against distilled water, frozen and dehydrated *in vacuo* and then

over P_2O_5 gave carbon 51.4, nitrogen 9.0 and phosphorous 0.87 per cent. By extraction with alcohol-ether (3–1) and reextraction of the lipids with petroleum ether,[5,6] the lipid fraction was 24 and the non-lipid fraction 77.76 per cent. of the material. The total lipid fraction was made up of 10.64 per cent. phospholipid, 5.67 per cent. cholesterol and 7.64 per cent. neutral fat. Of the total phosphorous, 52 per cent. were found in the lipid fraction. If the remainder of the phosphorous was present in nucleic acid, the virus would contain about 4.0 per cent. nucleic acid of the desoxypentose type.

The total carbohydrate[7] (as glucose) content of the whole virus was 10 per cent. The carbohydrate, apparently firmly bound in complex form, was greatly in excess of that expected for the amount of nucleic acid present. Subtracting this value from that of the non-lipid fraction, 77.76 per cent., the probable protein content of the virus was about 67.76 per cent.

A similar finding has been encountered with influenza virus B (Lee strain), in which the total carbohydrate was 9.3 per cent.

The infectious unit of the virus when inoculated in 0.05 ml volumes in chick embryos was $10^{-12.16}$ to $10^{-13.1}$ grams with an average of $10^{-12.74}$. One concentrate, purified by adsorption, elution and centrifugation and titrated in fivefold dilutions employing 40 embryos per dilution, gave the value $10^{-13.11}$ grams; another concentrate purified by ultracentrifugation alone and titrated similarly in 40 embryos per dilution gave $10^{-12.75}$ grams. The hemagglutinative activity of the concentrates was such that $10^{-6.16}$ to $10^{-6.46}$ grams with an average of $10^{-6.29}$ grams gave the 2 plus end point.

A. R. TAYLOR
D. G. SHARP
I. W. MCLEAN, JR.[8]
DOROTHY BEARD
J. W. BEARD[9]
J. H. DINGLE[9]
A. E. FELLER[9]

DEPARTMENT OF SURGERY,
DUKE UNIVERSITY SCHOOL OF MEDICINE
AND
RESPIRATORY DISEASES COMMISSION LABORATORY
STATION HOSPITAL, SECTION 2, FORT BRAGG, N. C.

[5] E. Kirk, *Jour. Biol. Chem.*, 106: 191, 1943.
[6] E. Kirk, I. H. Page and D. D. Van Slyke, *Jour. Biol. Chem.*, 106: 203, 1943.
[7] J. Tillmans and K. Philippi, *Biochemische Zeitschrift*, 256: 36, 1929.
[8] Fellow in virus research, Division of Medical Sciences of the National Research Council.
[9] Representing the Commission on Acute Respiratory Diseases, whose other members are Drs. T. J. Abernethy, G. F. Badger, N. L. Cressy, Captain, M. C., A. D. Langmuir, C. H. Rammelkamp and E. Strauss.

DECREASE IN LACTIC ACID CONTENT OF THE BRAIN IN POLIOMYELITIS[1]

RACKER and Kabat[2] demonstrated that anaerobic breakdown of glucose is significantly decreased in mouse brain infected with poliomyelitis virus, while oxidation of glucose by the infected tissue is apparently unimpaired. Brodie and Wortis[3] reported some determinations of the lactic acid content of brain and spinal cord in poliomyelitic monkeys. Their data indicate a decrease in lactic acid content of the brains infected with poliomyelitis as compared to normal monkey brains, although there were too few determinations to be conclusive. It therefore appeared of interest to determine the lactic acid content of the brain in mice infected with poliomyelitis.

Swiss albino mice four to six weeks of age were inoculated intracerebrally with a 10 per cent. suspension of tissue of the central nervous system from mice infected with the Lansing strain of poliomyelitis virus. When the animals showed definite paralysis, they were sacrificed by sudden immersion in a mixture of solid CO_2 and ether and left in the mixture for at least ten minutes. The brains were removed carefully using chilled instruments; the tissue was crushed and finely ground in a chilled mortar or tissue crusher and added to cold trichloroacetic acid in a tared glass-stoppered flask. The flask was reweighed and placed in an ice bath. After fifteen minutes, the solution was filtered. Lactic acid of the filtrate was determined by the Miller-Muntz method using the photoelectric colorimeter.[4] Lactic acid content of the normal mouse brain was determined by the same procedure. Three brains were pooled for each determination, giving a total wet weight of brain tissue of approximately one gram.

Data on lactic acid content of the brain in normal mice and in mice infected with the viruses of poliomyelitis and encephalitis are presented in Table I. The lactic acid content of the normal mouse brain is similar to the results reported by Stone,[5] who obtained a mean value of 18.9 mg per cent. and a range of 12–25 mg per cent. after freezing in liquid air. It is apparent that brain lactic acid is decreased in poliomyelitis, since the mean value is only 16.0 mg per cent. as compared to 20.7 mg per cent. for the normal controls, a decrease of 22.7 per cent. By use of the "t distribution,"[6] this difference has been found to be

[1] Aided by a grant from the National Foundation for Infantile Paralysis. Dr. Kabat is at present with the Division of Chemotherapy, National Institute of Health, Bethesda, Md.
[2] E. Racker and H. Kabat, *Jour. Exp. Med.*, 76: 579, 1942.
[3] M. Brodie and S. B. Wortis, *Arch. Neurol. and Psychiat.*, 32: 1159, 1934.
[4] R. H. Koenemann, *Jour. Biol. Chem.*, 135: 105, 1940.
[5] W. E. Stone, *Biochem. Jour.*, 32: 1908, 1938.

statistically significant. On the other hand, a preliminary study of brain lactic acid content in mice infected with encephalitis (3 determinations on Western equine encephalomyelitis and 2 on St. Louis encephalitis) showed no decrease from normal. A decrease in lactic acid content of the brain tissue in poliomyelitis is probably related to the decreased ability of the brain to break down glucose to lactic acid under anaerobic conditions demonstrated by Racker

TABLE 1

LACTIC ACID CONTENT OF THE BRAIN OF NORMAL, POLIOMYELITIC AND ENCEPHALITIC MICE*

	Normal	Poliomyelitis	Encephalitis	
			Western equine	St. Louis
	19.9	16.5	23.0	15.9
	16.9	17.9	34.0	21.0
	22.9	13.2	15.0	
	19.3	16.4		
	20.5	15.0		
	20.2	11.8		
	22.4	7.9		
	12.6	16.4		
	25.9	21.2		
	21.7	20.6		
	18.9			
	19.8			
	26.7			
	16.3			
No. of determinations	15	11	(both types) 5	
range	12.6–26.7	7.9 to 21.2	15.0–34.0	
mean	20.7	16.0	21.5	
t		3.04	0.43	

* All values in mg per 100 grams of brain tissue.

and Kabat.[2] That this effect of poliomyelitis may be specific and not produced by other neurotropic viruses is suggested by recent metabolic studies.[7]

In another set of experiments, normal and poliomyelitic mice were decapitated and the heads kept at 37° C. for definite time intervals and then frozen in dry ice-ether mixtures. The progressive increase in lactic acid in the brain following decapitation is illustrated in Fig. 1. These results are preliminary, since each point on the curves represents an average of no no more than three determinations. The production of lactic acid under anaerobic conditions from substrates present in the brain tissue appears to be at least as rapid in poliomyelitis as in normal controls, with the possible exception of the period immediately following decapitation. Kerr and Ghantus[8] studied the production of lactic acid during autolysis in the dog brain and found that sugar disappears within 3 to 5 minutes and 80–85 per cent. of the glycogen is lost within 15 minutes. Even in the early stages of autolysis, however, glycogen breakdown provides a considerable portion of the lactic acid produced. Since the rate of formation of lactic acid in autolysis depends on the concentration of at least two substrates in the brain tissue, glucose and glycogen, as well as on many other factors, the experiment illustrated in Fig. 1 may not be considered evidence against a decreased anaerobic metabolism of glucose in the brain in poliomyelitis.

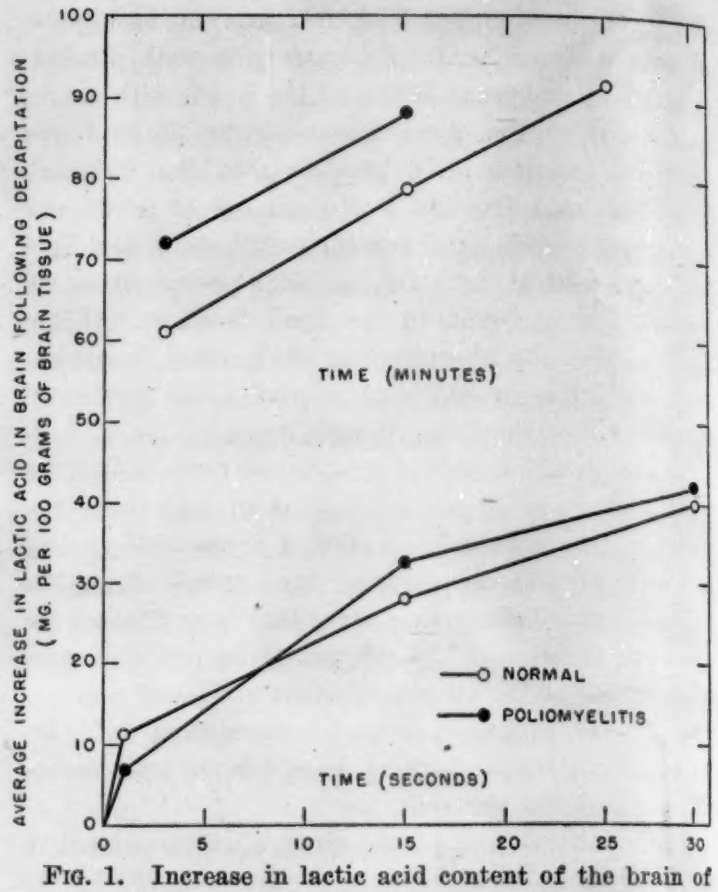


FIG. 1. Increase in lactic acid content of the brain of normal mice and of mice infected with the virus of poliomyelitis during postmortem autolysis. The abscissa for the lower curves represents seconds and for the upper curves represents minutes.

Another type of experiment is presented in Table 2. Mice were sacrificed by freezing in a dry ice-

TABLE 2

EFFECT ON BRAIN LACTIC ACID OF STORAGE OF MICE IN DRY ICE BOX

Time after death (hours)	Normal	Poliomyelitis
0	20.7*	16.0*
3	22.4	....
3.5	29.5	....
5	41.5	....
6.5	31.9	....
12	33.4	16.9
24	53.1	13.8
48	30.2	22.7
72	40.3	....
80	31.0	12.1
120	30.3	20.7
No. of determinations	10	5
range	22.4 to 53.1	12.1 to 22.7
mean	34.4	17.2
t†	5.48	0.545

* Average.
† Compared to mean of determinations on unstored brain.

[6] F. E. Croxton and D. J. Cowden, "Applied General Statistics," Prentice-Hall, Inc., New York, 1940.

[7] M. Nickle and H. Kabat. Unpublished observations.

[8] S. E. Kerr and M. Ghantus, *Jour. Biol. Chem.*, 117: 219, 1937.

ether mixture and then stored for various periods of time in a dry ice box before removal of the brains and analysis for lactic acid. There is a statistically significant though variable increase in lactic acid content in the stored normal brain while no significant change was noted in the stored poliomyelitic brain. This experiment requires confirmation before speculation on the mechanism would be advisable.

Summary: Lactic acid content of the brain is significantly decreased in mice infected with the virus of poliomyelitis. This appears to be additional evidence for the view that the virus may interfere in a specific manner with cell metabolism.

HERMAN KABAT
DOROTHY ERICKSON
CARL EKLUND
MARGARET NICKLE

DEPARTMENT OF PHYSIOLOGY,
UNIVERSITY OF MINNESOTA, AND
DIVISION OF PREVENTABLE DISEASES,
MINNESOTA DEPARTMENT OF HEALTH

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A RAPID IRON HEMATOXYLIN TISSUE STAIN FOR ROUTINE LABORATORY USE

THE Heidenhain iron hematoxylin method for tissue staining is one of the most important and satisfactory cytological stains for the demonstration of fine nuclear and cellular detail. Its use as a routine stain would be highly desired. However, the length and relatively difficult technique of the iron hematoxylin stain restricts this method to the more or less special, non-routine procedures. Although it is possible to stain tissues with Heidenhain iron hematoxylin in as little as one to two hours, the most satisfactory results require from twelve hours to two days (Guyer,[1] Bensley and Bensley[2]). In view of the desirability of the use of this stain routinely, we have attempted to find a suitable modification whereby the technique might be shortened considerably and made more adaptable for common laboratory use. By incorporating a single change in the usual procedure, to be described below, the time necessary for staining the tissue is shortened to even less than that entailed for Delafield's or Harris's hematoxylin stain.

The modification simply consists in fixing and mordanting the tissue simultaneously in Bouin's fixative containing one and a half grams of ferric alum (Ferric ammonium sulphate) in 100 cc of fixative. The Bouin's acts as the fixative and the ferric alum functions as the mordant. The ferric alum does not impair the excellent fixative qualities of Bouin's, while Bouin's does not interfere with the mordanting of the tissue by ferric alum. The combined fixative and mordant has no deleterious effect upon the tissue.

After removal of the tissue from the combined fixative-mordant, it is prepared for mounting and staining by following the procedure usually employed for hematoxylin stains. Either ethyl alcohol or dioxan may be used for the dehydrating agent and 0.5 per cent. hematoxylin to stain. Inasmuch as mordanting has already been accomplished during fixation, the sectioned tissue may be placed directly into the hematoxylin after passing the mounted sections from xylol to water, using either dioxan or alcohol in the intermediate steps. The tissue will overstain in from 3 to 5 minutes and destaining may be carried out as desired in 0.1 per cent. HCl (aqueous or 35 per cent. alcoholic solution). The acid destain is followed by an alkaline aqueous or alcoholic wash prepared by the addition of several cc of a saturated solution of lithium carbonate or 1 per cent. solution of sodium bicarbonate to 100 cc of water or 35 per cent. alcohol, respectively.

The modification of the accepted iron hematoxylin procedure has been used successfully on many different types of tissues and the resulting cytological picture is comparable to that observed after use of the lengthy Heidenhain iron hematoxylin method. There are, however, two cautions worthy of note: One is that although this technique is very adaptable for small pieces of tissues (5 to 6 mm cubed), larger pieces of tissue require longer fixation. This is to allow for sufficient penetration of the ferric alum to complete the mordanting process. For the smaller pieces of tissue, the combined fixative-mordanting process is completed by the time the tissue would be normally fixed when placed in the fixative alone. The second point is that in the process of staining the slides it is important that the transfer of tissue from dioxan or alcohol to the dye should be accomplished as rapidly as possible. If the tissue stays in the intermittent water wash for too long a period of time the ferric alum may be completely removed from the tissue and remordanting will be necessary.

Summary: A modification of the standard Heidenhain iron hematoxylin stain is described in which the process of fixation (in Bouin's) and mordanting (ferric alum) are executed simultaneously instead of independently. Consequently, mordanting just prior to

[1] M. F. Guyer, "Animal Micrology," University of Chicago Press, Chicago, 1936.

[2] R. R. Bensley and S. H. Bensley, "Handbook of Histological and Cytological Technique," University of Chicago Press, Chicago, 1938.

staining is unnecessary. Staining takes from 3 to 5 minutes. This modification of the usual procedure makes for a rapid and simple stain for routine laboratory use with the resulting stain comparable to that observed after use of the accepted and lengthy Heidenhain iron hematoxylin method.

HERBERT S. KUPPERMAN
CHARLES R. NOBACK

SCHOOL OF MEDICINE OF
THE UNIVERSITY OF GEORGIA,
AUGUSTA

A MYOTOME FOR BIOPSY OF MUSCLE[1]

IN a study of the chemistry and metabolism of muscle it is desirable to have a means by which small quantities of muscle may be removed simply and frequently from patients and experimental animals. Various tissue punches and methods of aspiration biopsy have been described.[2-7] These methods are well adapted for the removal of specimens of friable tissues. They are not useful, however, in obtaining specimens of less friable tissues such as muscle. An instrument has been devised for the removal of portions of muscle, 20 to 50 milligrams in weight, without disruption of the histological structure. This quantity of muscle is sufficient for various analyses by microchemical procedures and for histological studies.

The instrument or myotome consists of an outer stainless steel tube, the distal end of which is square and provided with cutting edges (Fig. 1). A second and shorter stainless steel tube fits within the outer tube and serves as a plunger which is kept in position by a steel spring. To its distal end is attached a flexible steel blade which moves through a double slot in the wall of the outer tube. This blade, like that in the large viscerotome of Soper, Rickard and Crawford,[8] acts as a knife to sever the base of the specimen of muscle entering the instrument. An obturator fits within the lumen of the inner tube.

The myotome is used in the following manner. After sterilization of the skin and its infiltration with novocain solution, a minute stab wound is made with a sharp-pointed knife. The myotome with the obturator inserted is passed through the skin incision and through the subcutaneous tissue. Increased resistance is met when the myotome enters the muscle. At this time the obturator is withdrawn. The instrument is inserted further and directed at an angle of 60 degrees to the horizontal and in the longitudinal plane of the

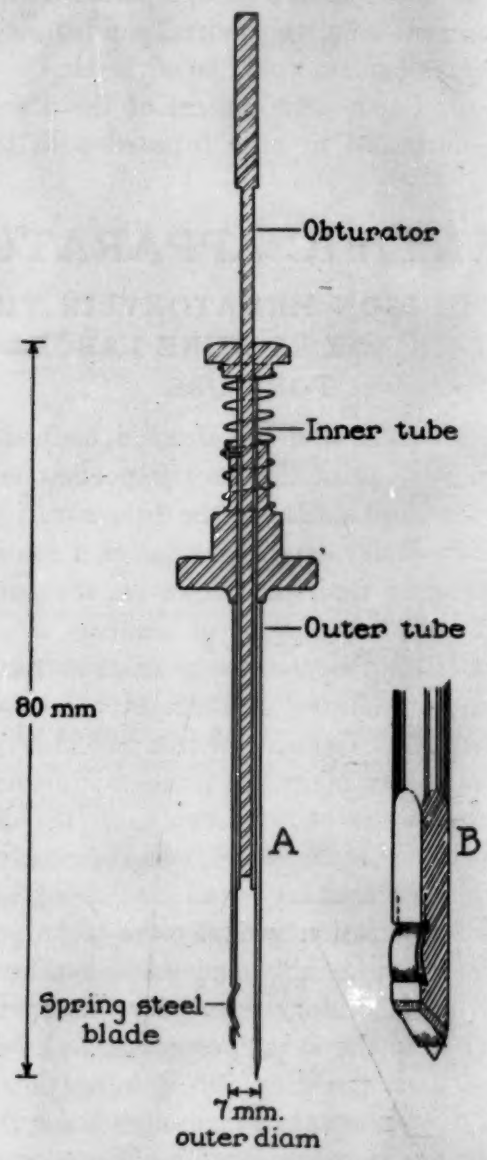


FIG. 1. A. Cross section of the myotome. B. Distal end showing the cutting edges.

muscle fibers. A portion of the muscle enters the outer tube. The inner tube or plunger is then pressed down to sever its attached end. Pressure is maintained on the plunger as the myotome is withdrawn. After withdrawal the plunger is released and the obturator inserted to expel the specimen. Several specimens may be taken through a single skin incision.

ROBERT E. SHANK[9]
MEDICAL CORPS, U. S.
NAVAL RESERVE

CHARLES L. HOAGLAND
HOSPITAL OF THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH,
NEW YORK, N. Y.

[1] The Bureau of Medicine and Surgery does not necessarily undertake to endorse views or opinions which are expressed in this paper.

[2] H. E. Martin and E. B. Ellis, *Annals of Surgery*, 92: 169, 1930.

[3] W. J. Hoffman, *Am. Jour. Cancer*, 15: 212, 1931.

[4] K. Lindblom, *Acta Radiologica*, 16: 295, 1935.

[5] C. C. Franseen, *New Eng. Jour. Med.*, 224: 1054, 1941.

[6] J. Tenopyr and I. Silverman, *Radiology*, 36: 57, 1941.

[7] M. L. Weinstein, M. Schindler and E. L. Adams, *Ann. Surg.*, 115: 880, 1942.

[8] F. L. Soper, E. R. Rickard and P. J. Crawford, *Am. Jour. Hyg.*, 19: 549, 1934.

[9] Member of the United States Navy Research Unit at the Rockefeller Hospital.

McGraw-Hill Books of Timely Interest

SUCCESSFUL POULTRY MANAGEMENT

By MORLEY A. JULL
ead, Poultry Department, University of Maryland

467 pages, 6 x 9, 187 illustrations
Textbook edition, $2.50

ere is a clear, helpful treatment of all the portant problems faced in making the poul- y enterprise a successful, paying field of ork. It provides easy-to-find, thoroughly able, and concrete information, including abundance of facts and data drawn from cent research and from the practical experi- ce of poultrymen.

he book presents tested methods of poultry oduction and marketing that have real mon- ary value. Among some of the important atures discussed are: the kind of stock to ep, including results secured from different eeds and varieties; how to improve home ocks most readily; a new score card for judg- g laying ability; plans and specifications for ooding and laying houses and range shel- rs; how to keep losses from mortality and her causes down to the minimum; how to arket eggs to best advantage; and a chart owing the more important seasonal prob- ms of poultry management.

Chapter Headings

I. Keeping Good Stock
II. Culling to Maintain Efficient Production
III. Breeding for More Efficient Production
IV. Renewing the Flock
V. Brooding and Housing the Growing Stock
VI. Housing the Laying Flock
VII. Providing Chickens with Good Nutrition
VIII. Feeding for Efficient Meat and Egg Production
IX. Controlling Losses from Mortality and Other Causes
X. Marketing Eggs
XI. Marketing Chickens
XII. Making a Success of the Chicken

THE TECHNICAL SECRETARY SERIES

By QUEENA HAZELTON
Formerly of Texas Christian University

This important new series is designed primarily to provide teachers and students with instruction manuals for specialized stenographic and secretarial training in five fields: military, naval, medical, aviation, and engineering. These manuals should greatly facilitate the training of those already in service and enable schools and colleges to speed up their specialized secretarial training programs to meet the insistent demand for secretaries in those branches of service.

Each of these manuals is organized as follows: (1) technical previews in Gregg shorthand; (2) appropriate solid-matter dictation, based on the previews; and (3) a complete glossary of terms. All terms are defined fully and, where advisable, are spelled phonetically.

THE MILITARY STENOGRAPHER
140 pages, $1.00

THE NAVAL STENOGRAPHER
128 pages, $1.00

THE MEDICAL AND SURGICAL SECRETARY
319 pages, $2.00

THE AVIATION SECRETARY
233 pages, $1.50

SECRETARY TO THE ENGINEER
309 pages, $1.75

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

30 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C.2

SCIENCE NEWS

Science Service, Washington, D. C.

FOOD PLANTS OF THE SOUTH PACIFIC AREA

FINDING food enough in the jungle should become less of a problem for our fighters in the Pacific theater of war: introductions to a large variety of edible plants have now been arranged by one of the world's leading botanists, Dr. E. D. Merrill, of Harvard University, through a new technical manual of the War Department, entitled "Emergency and Poisonous Plants of the Islands of the Pacific."

The handbook is small (pocket-size, and only 149 pages), but it is complete, thorough and practical. A large proportion of the species described are also pictured; there are 113 simple but adequate pen-and-ink drawings. Names are given first in English, then the botanist's Latin for positive identification, then native names in anywhere up to 20 or 30 local dialects, just in case you have a chance to ask a brown neighbor any questions.

Divisions are along strictly practical lines: plants with edible leaves and stems, with fleshy tubers or roots, with good fruits, with edible seeds. Some are not native to the jungle, but may be found where gardens once have been, or "gone native." The latter group include such familiar American species as peanuts, lima beans and small wild tomatoes.

There is a short special section of plants used to stupefy fish, which includes the derris which has become a standard source of insect sprays. Another brief section is devoted to ferns, all of which are given a clean bill of health so far as danger from poison is concerned. The tree ferns can yield tasty and nutritious "cabbages"—their terminal buds. Similar "cabbages" can be obtained from many kinds of palms.

The rather numerous tribe of the aroids, identifiable by their "elephant-ear" leaves, some of them very large, include the taros, staple food source for thousands of dark islanders, but reputed to be poisonous to the uninitiated. They are not really poisonous, but they do contain myriads of sharp-pointed microscopic crystals, which can cause extreme irritation to the lining of the digestive tract. These can be eliminated by thorough cooking, after which the plants become one of the best sources of emergency food.

Unnecessary fears are often entertained about the "poisonous" character of the tropics. Dr. Merrill lists only half-a-dozen plant species as poisonous, among them the familiar castor-bean. He states also that the chances of getting bitten by a venomous serpent in the tropical jungle is rather less than that of being struck by a rattlesnake right here at home in the United States. Insects and other creeping things are really more troublesome—and more dangerous.

Dr. Merrill is in position to speak as one having authority. He was in active botanical work in the Philippines for more than twenty years, with a number of expeditions into other tropical lands. At present, besides being professor of botany at Harvard, he is supervis of the university's great collection of living trees, t Arnold Arboretum.

Although the book was prepared specifically for t use of the armed forces in the field, it can be obtained b any one from Superintendent of Public Document Washington, D. C., for 15 cents per copy.

FOOD SHORTAGE IN AMERICA

FOOD shortage may become a permanent, gaunt, u welcome guest at the American table, instead of the flee ing specter it is now considered to be, if bad farmin practices of the past are projected into the future. Suc was the warning of Louis Bromfield, novelist-agricultu alist and vice-president of Friends of the Land, before meeting in Tar Hollow, Ohio, of the second annual Co ference on Conservation, Nutrition and Human Healt

Farms increase in size and diminish in number fro decade to decade, Mr. Bromfield pointed out, deplorin the passing of the small farmer with his family-siz farm. Factory methods on the farm, especially the pra tice of concentrating on the production of a single ca crop over wide sections, the speaker regarded as especiall pernicious.

Mr. Bromfield also pointed out our national failure t replace our forests as fast as they are being depleted "This was largely a forest country and for more than hundred years we have been cutting down forests rec lessly, until now even the worst offenders, the lumber an paper-pulp industries, are alarmed over the fact that i a few more years their supply of raw material will largel have vanished. And this at a time when the uses of woo are supplanting metals, wool and other fundamentals t a degree which establishes what might be called a 'woo economy.'

"Worst of all, little effort has been made to restor our forests. We have only to look at Europe to realiz the vital importance of trees, not only to peace but t wartime economy. . . . Forests require lifetimes to grow They are not made over night."—FRANK THONE.

INTER-AMERICAN STANDARDS FOR GOODS OF COMMERCE

How the good neighbor policy is being extended t develop inter-American standards for the goods of every day life was pointed out at the annual meeting of th American Institute of Electrical Engineers by Alberto Magno-Rodrigues, of the American Standards Associa tion.

The metric system of measurement, using centimeter and grams instead of inches and ounces, has been one o the biggest obstacles in adopting mutual standards be tween countries. Germans and other Europeans who u the metric system along with the Latin-Americans hav long capitalized on this advantage.

Mass production, which makes standardization so valu able, now reduces the importance of the unit of measure

A New
BLAKISTON
BOOK

Announcing

HECTOR, LEIN and SCOUTEN

Electronic Physics

Written to meet today's urgent need for a beginner's text presenting a clear, well integrated and modern study of the principles of electronic physics, this new text merits consideration of teachers because:

Its style and plan is new.

It was conceived by active teachers thoroughly acquainted with the subject and the problems to be solved.

The style is based on the assumption that its readers, although beginners, are interested in the way nature behaves.

Historical presentation is used only where it appears easier for the student and reasonably accurate for a modern perspective.

All electrical phenomena are presented from the electron-proton point of view. Even magnetism is described in terms of moving electric charges.

Ordinary light, wireless and x-rays are shown to be closely related and to be various aspects of electrical phenomena.

Photo-electricity and electron tubes are presented as a unified part of the entire subject.

The electrical nature of atoms of all elements is constantly used in the explanations throughout the text; the student is thereby enabled to promptly follow the phenomena of radioactivity and modern transmutation presented in the closing chapters of the book.

Each chapter is introduced by a brief preview of its contents and purposes. At the end of each chapter, the principal ideas are listed and the central thought is summarized.

Problems are presented in graded groups—a group for all students, a group for advanced students, and a third group consisting of a list for experimental work to be carried out in the laboratory or in the home.

Color is abundantly used in the illustrations. Pertinent features of the drawings are printed in red and the material parts in black. The treatment and execution of illustrations are outstanding pedagogical aids.

By L. Grant Hector, Herbert S. Lein and Clifford E. Scouten.
Probable Price $4.00 (July, 1943)

THE BLAKISTON COMPANY PHILADELPHIA 5, PENNA.

ment as compared with the specified size of the product. This makes the "go" and "not go" type of gauge popular over the inspector's scale and micrometer formerly used. The acceptance of the 25.4 ratio for the conversion of the inch to millimeters is also helping to pave the way for better understanding between the groups of nations who use different systems of weights and measures.

An Inter-American Department of the American Standards Association has been formed which is now conducting a survey among South American standardization groups and business men.

This country's experience in formulating standards for the goods of commerce is being used by a committee of Chinese technical men now in this country. They are formulating standards with an eye on the postwar period as part of a study of the economic rehabilitation of China.

More active cooperation with Mexico is also developing since a Department of National Standards was formed out of the old Department of Weights and Measures.

In Peru a project is under way to establish an official standardizing body for the first time. Chile expects to have a similar group in the near future, either sponsored by the engineers or under government support.

A STATIC NEUTRALIZER

THAT static has finally been exorcised was announced at the dedicatory exercises opening the new Goodyear Research Laboratory at Akron, Ohio. A new device, developed by Goodyear engineers and officially christened the radio static neutralizer, eliminates the disturbing atmospherics caused by lightning flashes and sparks from powerful electrical apparatus, that cause such annoying crashes and sputterings in radio programs and manifest themselves by black spots and streaks on radio-transmitted pictures.

The static neutralizer will be used for the present by the armed forces in improving communications between planes, ships, tanks and ground stations, in bettering the performance of radar, and in securing clearer transmission of military maps and reconnaissance photographs. After the war it will become available for use on civilian radio sets.

The neutralizer makes use of small electronic tubes, which are automatically adjusted to each radio signal, whether weak or strong. They discriminate between static and the desired signal, and automatically control the amount of static energy that can pass through the radio set. It also gets rid of static on the same frequency as the incoming signal, by means of a circuit that uses the energy of the static to build up an electronic current of opposite sign. This current then neutralizes the static so that it has no effect on the signal.—FRANK THONE.

ITEMS

PENICILLIN, the potent germ-fighter from mold, is "far superior" to the sulfa drugs in the treatment of gas gangrene, one of the most serious complications of war wounds, Dr. Lucile R. Hac and Dr. Agnes C. Hubert, of the University of Chicago and the Chicago Lying-In Hospital, report to the Society for Experimental Biology and Medicine. Their report is based on laboratory experiments with mice and guinea pigs infected with Clostridium welchii, the germ most frequently found in cases of gas gangrene. A single injection under the skin of 50 Florey units of penicillin given at the time the gas gangrene germs were inoculated into the mice protected 98 per cent. of the animals. Repeated small doses gave as good protection as single large doses. Delay in treatment lowers the survival rate, but not appreciably unless the delay is over three hours.

MOBILE housing is proving particularly useful where new war industries have been built. No ghost town will be left after the war, however, for the entire community can be folded up and moved elsewhere. Mobile houses for one and two families, such as those produced by the Palace Travel Coach Corporation, are even now being used to help alleviate the housing shortage. Some of the homes have four rooms. Already over 500 of the two-family units alone have been set up in a center near the Willow Run bomber plant. Utility units have been developed so that when the need for housing in a particular community has ended, they may be transferred to another location. These units consist of bath and toilet, laundry and office units. They are designed to accommodate from thirty-five families to an entire mobile community. Still in the experimental stage are houses to consist of five rooms, bath and reception hall. These houses, equipped with folding wings, ceilings and floors, are so compact that they can be hauled over the highways by truck trailers. Mobile houses at present are available only to war industries.

A NEW line of attack on malaria was predicted by Dr. W. McDowell Hammon, of the Medical School of the University of California, at the meeting of the Northern California Public Health Association. The new attack will probably aim at stopping the disease during the six days between the bite of the infected mosquito and the appearance of the malaria trophozoites in the red blood cells. This six-day period represents a stage in the cycle of malaria germs which scientists have only recently studied. Treatment heretofore has been aimed at the germs after they are seen in the blood stream. Studies of malaria in birds, however, show that the malaria germs develop in the reticulo-endothelial cells of the spleen, bone marrow and capillaries of the brain before they enter the blood cells. Although future research will probably be directed toward stopping the infection at this early stage, Dr. Hammon stated that "at present we must depend on mosquito repellants and larvae control. We must not relax our vigilance or our mosquito abatement budgets."

THE electrolytic process now employed in making tin cans will continue in use after the war, was reported by Dr. Charles Olin Ball, technical director of the Owens-Illinois Can Company, at the St. Louis meeting of the Institute of Food Technologists. This revolutionary change in the process was evolved because of the necessity of conserving tin, but is more efficient, more economical, and produces a better quality can than the old hot dip method.

BOOKS FOR WAR TRAINING COURSES

The Thermodynamics of Firearms

By CLARK SHOVE ROBINSON, Massachusetts Institute of Technology; Lt. Col., Ordnance Department Reserve, U. S. Army. 179 pages, $2.50

Among the first books in English to place interior ballistics on a sound theoretical basis by means of thermodynamics. It covers the behavior of propellant explosives in firearms in an elementary manner intended for the beginner rather than the expert. As the author explains: "The gun is a heat engine, used to convert the heat of exploding powder into mechanical energy, and as such is amenable to the fundamental concepts of thermodynamics . . ."

Radio Engineers' Handbook

By FREDERICK E. TERMAN, Stanford University. 1006 pages, $6.00

One of the most complete works of its kind ever published, this outstanding reference book and handbook presents a wealth of sound, technical information especially selected and organized to meet the needs of the engineer dealing with practical radio and electronic problems. The handbook deals with electronics and vacuum tubes, wave guides, cavity resonators, klystron and other microwave tubes, radio aids to navigation, oscillators, wide-band antennas, and hundreds of other topics of interest to the radio engineer.

Personal Leadership for Combat Officers

By PRENTISS B. REED, JR., Lieut., Coast Artillery Corps, U. S. Army. 116 pages, $1.50

Based on the well established principles of personal control by which organizations succeed, this manual is shaped specifically to the Army problem. Objectives and methods for leaders of Tactical Elements, Combat Teams, and Fire Units are included, which will provide a comprehensive framework for an officer's attitude, and in addition, give him most of the methods he will use in doing his job. The book specifies what to do and how to go about it.

Elements of Electrical Circuits and Machinery

By GROVER C. BLALOCK, Purdue University. 347 pages, $3.00

Intended primarily for short wartime courses in electrical circuit theory and the practical application of electrical equipment. The book is largely an abridgment of the author's widely used text *Principles of Electrical Engineering*. The author has been careful to include all the essential basic material, without going into too much detail. Mathematical treatments have been kept to a minimum.

Mathematics of Flight

By JAMES NAIDICH, Manhattan High School of Aviation Trades, New York, N. Y. 415 pages, textbook edition, $2.20

Includes the topics in algebra, geometry, and trigonometry needed in pre-flight training. The text is complete, and all topics are presented fully and thoroughly. There is a comprehensive treatment of aerodynamics, with emphasis on mathematical and aeronautical facts of importance to the pilot. The problem material is enriched by practical aviation material drawn from aviation mechanics, air pilot training, aerodynamics, and air navigation.

Radio Materiel Guide

By FRANCIS E. ALMSTEAD, Lieut., USNR, Materiel Officer, U. S. Naval Training School, Noroton Heights, Conn., and F. R. L. TUTHILL, Lieut. Comdr., USNR, Eastern Sea Frontier Command. 242 pages, $2.00

Designed to prepare students to do efficient work in radio repair, service, and maintenance, especially in the armed forces. The book has been kept brief enough to be mastered in the accelerated war courses, but has all the essentials to acquaint the student with the equipment he will be using.

Mathematics Essential to Electricity and Radio

By NELSON M. COOKE, Lieut., U. S. Navy, Executive Officer, Naval Research Laboratory, Washington, D. C. 382 pages, textbook edition, $2.40

Presents the essentials of secondary school mathematics required for electricity and radio. Offering the technical content of both subjects side by side with the mathematics, it gives the student a quick working knowledge of theory and applications. The mathematics includes material on equations, power of ten, factoring, logarithms, trigonometric functions, and vectors.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

SCIENCE NEWS

Science Service, Washington, D. C.

THE MILKY WAY IN CONSTELLATION OF CEPHEUS

DARK, obscuring matter in space interferes with our view of the Milky Way in the region of the constellation of Cepheus. Although on a clear evening we may believe we have a clear view of the stars, no part of the Milky Way studied by Dr. A. Marguerite Risley, of Randolph-Macon Woman's College, and Harvard Observatory was entirely free of absorbing material.

Just as the light, fleecy clouds and the dark thunder clouds in our atmosphere keep us from seeing the heavens clearly, so dark matter many light years out in space veils the true brilliance of the stars. Dark lanes and flares are characteristic of Cepheus north of the galactic plane. In some places dark nebulae are visible, while in others, although there is no obvious obscuration, the stars are found to be shining through a thin veil of dark material.

A total of 750 square degrees, three-fourths of the area between 20 hours, 30 minutes, and 0 hours in right ascension, and plus 45 degrees to plus 75 degrees in declination, were studied. Miss Risley reports in *The Astrophysical Journal* that not a single part of this field could be considered unobscured.

The survey points out, however, several comparatively clear regions where the study of the colors of the stars of known spectral type should let us know the effectiveness of the haze, and enable us to get a better idea of the star density in the direction of Cepheus.

T. CORONAE BOREALIS

THE old nova of T. Coronae Borealis, one of the stars in the constellation of the northern crown now high in the evening sky, is believed to have developed a stationary shell. This phenomenon is occasionally observed in early type stars, according to a report by Dr. Rudolph Minkowski, of the Mount Wilson Observatory, but this is the first time on record that an old nova has shown such a development.

T. Coronae Borealis is believed to be a binary system composed of a normal M-type giant and a blue variable star, the old nova. The hotter component of this star, probably the old nova of 1866, is credited by Dr. Minkowski in a report to the Astronomical Society of the Pacific with not only having become brighter, but with also having developed a stationary shell.

The actions of many stars can best be determined by a study of the star's spectrum. A comparison of the spectrum of Nova T. Coronae Borealis made in February, 1943, with one made in May, 1942, states Dr. Minkowski, shows a profound change in the violet and near-ultraviolet while the two are very similar in the red.

A number of absorption lines, characteristic of light shining through a glowing gas, have recently appeared in the spectrum. The faint presence of one or two absorption lines of helium in the earlier spectrum was probably the first indication that this transformation was taking place.

AN IMPROVED METHOD FOR RIFLING ARTILLERY

THE head of the principal national organization for coordinating and making effective for war purposes American scientific resources, Dr. Vannevar Bush, director of the Office of Scientific Research and Development, personally contributes a significant technical advance, among the five hundred and eighty inventions of the week on which patents have been issued by the U. S. Patent Office.

Dr. Bush's invention is an improved method for rifling artillery, which makes practicable a type of gun bore which ordnance men have long regarded as ideal but unattainable in practice. Gun bores at present are cylindrical or practically so. Much better, for the purposes of obtaining smoothness of starting and movement of the projectile when fired, would be a bore having a cylindrical portion near the breech, a gradually tapering portion throughout the greater part of the length, and another cylindrical portion near the muzzle. Such a gun might be rifled with existing tools, but the cost in money and time would be prohibitive.

In Dr. Bush's method, the barrel of the gun is bored and reamed to approximately the desired conformation. Then a plug, with its outer dimensions closely corresponding to the desired shape of the finished, rifled interior, is inserted. This plug has a groove along one side, in which two long wedges operate. These wedges press against the smooth interior of the bore a series of cutting tools, linked into an endless chain, which is slowly drawn through the gun while it slowly rotates around the stationary plug. This produces a series of twisted grooves, properly rifling the gun, no matter what the curves of its breach-to-muzzle profile may be.

The inventor has assigned rights in his patent, no. 2,319,206, royalty-free to the Government.—FRANK THONE.

THE AIRPLANE OF THE FUTURE

FOUR-WHEELED planes with bigger, more efficient engines housed within the wings are possible features of future air transports is predicted by W. W. Davies, United Air Lines research engineer, in a report to the American Society of Mechanical Engineers. Continued rapid development of all types of aircraft engines after the war should produce at least a horsepower for every pound of engine weight, due to better design and improved materials. Engines will be much more powerful. Current research projects indicate that specific fuel consumption at normal cruising power may be cut by nearly a fourth. Fuel of higher octane rating is one means of lowering fuel consumption, thereby cutting down the fuel load per trip.

War experience in the higher altitudes will undoubtedly make it possible to cruise satisfactorily at well above 20,000 feet and yet keep fuel consumption to a reasonable figure. Diesel engines may well power a good percentage of future aircraft, but fuel consumption will not be as amazingly low as enthusiasts have claimed.

Propeller efficiency will be pushed still higher and prop styles may look strange to oldtime fliers. Wide blades, multi-blades, dual or counter-rotating types and probably completely reversible units are some of the possibilities. Into the discard will go conventional landing gears, generally speaking. In their stead will come increased use of the tricycle gear, main wheels plus a nose wheel, and future developments may well see the use of four wheels, two each fore and aft on either side of the fuselage.

Over-all drag of planes has been cut by a fourth through new developments already seeing service. Auxiliary high-lift devices coupled with improved wing design aid materially in maintaining desirable landing and maneuvering speeds.

"Considerable effort has been expended in research toward the production of new wing designs and airfoils," Mr. Davies states. "The wing itself is responsible for a major portion of the over-all drag of an airplane." Reduction in wing area has further lowered the amount of drag. This gives higher wing loadings, often looked at askance because of questionable effects on take-off and landing performance and because of troublesome icing difficulties.

However, larger airports of the future will solve the take-off problem, while complete instrument landing control and better auxiliary high-lift devices will do much to permit increased landing and maneuvering speeds. Use of heat will nullify the icing problem.

For more economical operation of future transports the present bucket-brigade type of loading must be replaced. "Future equipment must be so designed that, regardless of airplane size, complete loading, transfer, and unloading can be accomplished in five minutes." Movable ramps, conveyor systems and docking facilities are some of the possible solutions. Further delay is due to trouble-shooting and repair work during airport stops.

"Future equipment will be so designed," according to Mr. Davies, "that complete replacement of a malfunctioning assembly or unit can be made during a scheduled stop. This may apply even to the complete power plant."

ITEMS

ANOTHER volcano has suddenly burst forth near the now famous Paricutin cone which itself rose unexpectedly from a corn field last February some 300 miles west of Mexico City. When it appeared a burst of fire was seen a hundred miles away in Morelia, the capital of the state of Michoacan. The new cone which is increasing rapidly is located five hundred feet west of the older active volvano. Simultaneously with its birth there was greater activity in the 1000-foot high original crater. Its creation was accompanied by violent and noisy eruptions. Both craters have continued active. The little village of San Juan Parangaricutiro about three miles from the twin volcanoes is reported to be virtually abandoned after the outburst. Dr. Ezequiel Ordonez, dean of Mexican geologists, stated recently that a narrowing of Paricutin's crater was in his opinion the forerunner to a new outburst near-by. He left Mexico City to revisit the volcano and probably was there when the new volcano was born.

THE newly occupied island bases in the southwest Pacific—the Trobriands, Woodlark and New Georgia—are smaller editions of the areas in New Guinea and the Solomons previously recovered from the Japanese invaders. They are the rugged, volcanic tops of submerged mountain systems; the Trobriands and Woodlark constituting an extension of the mountainous "tail" of New Guinea, and New Georgia a short emergent range parallel to those of the other Solomons. Like their larger neighbors, they are covered with lush tropical vegetation, with coconut plantations as practically the only type of agriculture of commercial importance. Mineral resources are unimportant or little developed. The natives are all of the dark-skinned, fuzzy-haired Melanesian stock already familiar to our forces in the field, and to the public through news pictures and newsreels. They are among the most primitive peoples of the world.

THE national medical service of England must be designed to prevent rather than cure. The causes of ill health should be tracked down and removed, the *Journal* of the American Medical Association reports that Ernest Brown, British minister of health, urged recently. It is not enough to organize the treatment of sickness, individual fitness should be promoted and maintained. Every one in England, under the Beveridge scheme, would have at his beck and call when need arose the best medical services that modern science could provide. Yet the medical service could be organized so as to give the average practitioner freedom to utilize his professional talents to the best advantage. The minister of health declared that the government looked confidently to the local health authorities, experienced in meeting both war- and peace-time problems, to undertake the new responsibility.

SEAWEEDS, long neglected by Americans as land weeds, are now under close scrutiny at the University of California as possible sources of food. In rather crude form, they are traditional articles of diet in Japan; and it is considered not impossible that with better processing they might be made palatable to Americans and Europeans. In the botanical laboratories a Chinese scientist, Dr. C. K. Tseng, has transplanted a number of species from off-shore rocks to tanks of sea water where they can be studied under known and controlled conditions. His idea eventually is to establish a "submarine agriculture," with large-scale cultivation and regular harvesting methods. A South African botanist now at the University, Dr. George Papenfus, states that several seaweed species along the coasts of his native land have been found to be good sources of agar, a kind of vegetable gelatin needed for laboratory culturing of bacteria and other microorganisms. Before the war, agar was supplied practically altogether from Japan, and the lack of it has been a serious handicap in hospitals and research laboratories.

8 Important Reinhold Books

The AMAZING PETROLEUM INDUSTRY

by V. A. Kalichevsky

This fascinating book highlights the story of Petroleum and explains to the man on the street the elementary facts about the nature and composition of the world's most important raw material.

Through the efforts of the research chemists and engineers of the petroleum industry, we have been furnished with aviation gasoline, lubricating oil and fuel oil, as well as with synthetic rubber, explosives, the wonder-working sulfa drugs, and hundreds of other useful products!

An important book for those who would like to familiarize themselves with the basic facts about Petroleum and its Petroleum products.

234 Pages **$2.25**

NOXIOUS GASES

by Yandell Henderson and Howard W. Haggard

Due to the war, this book assumes immediate and vital importance. It describes in detail the toxic effects of all gases and vapors encountered in industrial areas due to fires and explosions and authoritatively sets forth the correct treatment for all types of asphyxia. Several chapters are devoted to an extensive classification of toxic gases according to their mode of action. This book will prove invaluable to students training to become industrial chemists or safety engineers who will work in plants producing synthetic organic chemicals.

294 Pages **$3.50**

PROTEINS, AMINO ACIDS AND PEPTIDES

by Edwin J. Cohn and John T. Edsall

This masterly treatise on the physical chemistry of proteins, amino acids, and peptides will long stand as a scholarly monument of immense value and interest to chemists, biologists, immunologists, physicians, and investigators in related fields. Carefully prepared, this volume covers its subject exhaustively and is indispensable as a reference work or a compendium of information in this important and rapidly expanding field of research.

A. C. S. Monograph No. 90

686 Pages **Illustrated** **$13.50**

A COURSE IN POWDER METALLURGY

by Walter J. Baeza

A book that will prove highly useful and important in this fast developing field. Divided in three sections,—the first covers material comprising a series of lectures on the history of powder metallurgy, and on laboratory and plant processes; the second gives practical suggestions for assigning experiments requiring minimum equipment; the third outlines 15 significant experiments and indicates the relation to theories discussed earlier in the book.

212 Pages **$3.50**

REINHOLD PUBLISHING CORPORATION

330 West 42nd Street, New York 18, N. Y.

Plant Sciences

Successful Textbooks

● **Laurie and Poesch**

Commercial Flower Forcing 3rd Ed.

This book presents a study of the fundamentals involved in growing flower crops for commerce. Methods recommended follow the practice of the better growers, supplemented by experimental work of the authors. 49 Illus., 565 Pages. $4.50. By Alex Laurie and G. H. Poesch, Ohio State University

● **Collings**

Commercial Fertilizers, Their Sources and Use 3rd Ed.

It is an authoritative source of information on all problems concerning fertilizers and their use in gaining larger yields of field and horticultural crops. 131 Illus., 12 in Colors. 480 Pages. $4.50. By G. H. Collings, Clemson Agricultural College

● **Bessey**

Textbook of Mycology

A standard text on the structure, life history and classification of the more important groups of fungi. An abundance of illustrations and a carefully prepared bibliography are included. 139 Illus., 495 Pages. $4.00. By E. A. Bessey, Michigan State College

● **Hylander and Stanley**

Plants and Man

A survey of botany as a cultural and practical subject. Economic and ecological aspects are stressed and the fundamental facts of morphology, physiology and taxonomy are concisely presented. 308 Illus., 518 Pages. $3.00. By C. J. Hylander and O. B. Stanley, Colgate University

● **Shoemaker**

Small-Fruit Culture

This authoritative guide and textbook presents the best methods in field practice. It incorporates practical information gathered from the experience of commercial growers and the extensive research work of the author. 52 Illus., 434 Pages. $3.50. By J. S. Shoemaker, Ohio State University

● **Chester**

Nature and Prevention of Plant Diseases

Designed for use of students majoring in field crops, horticulture, soils, entomology and related fields and for students in plant pathology, this text presents a study of the essential features of the science as exemplified in important diseases of leading crops. 207 Illus., 584 Pages, $4.50. By K. Starr Chester, Oklahoma Agricultural Experiment Station

THE BLAKISTON COMPANY, Philadelphia 5—

SCIENCE NEWS

Science Service, Washington, D. C.

GALACTIC CLUSTERS

DYNAMICAL friction is largely responsible for the continued existence of galactic clusters like the Pleiades. Dr. S. Chandrasekhar, of the Yerkes Observatory, points out that it also furnishes a strong support for the short life of these clusters, a life of only about 3,000,000,000 years. This period of 3,000,000,000 years is about the age of the earth, and therefore this theory has a bearing on the time scale for the universe.

Dr. Chandrasekhar believes that the force acting on a star varies because of the relative motions between the stars. The period of such fluctuation would be roughly equal to the time required for an average star to cross the average distance between the stars, which is estimated to be approximately 10,000 years. While it would be practically impossible to predict what would happen to a given star, its probable course can be followed.

If a period much longer than the estimated 10,000 years is considered, the change in velocity of a star would be the result of the addition of a large number of such fluctuations. The simultaneous influence of numerous fluctuations acts as a brake and has a decelerating effect in the direction of motion. This effect which causes each star to hold back all the other stars is dynamical friction. "It is friction because it has a decelerating effect on the motion of the star, and dynamical because it ceases to operate when the star is at rest and acts again only when it is in motion."

On account of the fluctuations, stars may be expected to be accelerated beyond the velocity of escape and the rate at which this happens gives a clue to the life of the cluster. Dr. Chandrasekhar believes that if dynamical friction is ignored, the cluster will disintegrate within 100,000,000 years. But if the frictional term is included, he finds that galactic clusters have lives averaging from 3,000,000,000 to 5,000,000,000 years.

This study into the dynamics of star clusters was presented by Dr. Chandrasekhar at the First National Conference on Physics held in May in Puebla. A number of American investigators attended the meeting at the invitation of the Mexican President Manuel Avila Camacho and the Governor of the state of Puebla, Dr. Gonzola Bautista.

SULFA DRUGS

Two new sulfa drug triumphs, a new chemical from liver that promises to save shock-threatened lives of burn victims, and studies showing vitamin B complex pills increase work output under certain conditions are the major medical advances reported in the *Journal* of the American Medical Association.

A relatively new sulfa drug, called sodium sulfathiazole desoxyephedrine, originally developed for nasal infections, greatly speeds recovery in the first, acute stage of shipyard eye (epidemic keratoconjunctivitis), according to the report of Dr. Harry S. Gradle, of Chicago, and Dr. G. H. Harrison, of Waukegan, Ill. Instead of lasting from 14 to 18 days, as it does in untreated cases, with the new treatment the first stage of this disease was reduced to from three to seven days.

Small daily doses of sulfadiazine effectively controlled an outbreak of scarlet fever at a U. S. naval station is stated by Lieut. Robert F. Watson, Lieut. Comdr. Francis F. Schwentker, Comdr. J. E. Fetherston and Dr. Sidney Rothbard, of the U. S. Navy Research Unit at the Hospital of the Rockefeller Institute, New York. They state that there is now enough evidence to justify the use of this drug in controlling epidemics not just of scarlet fever but "of streptococci infections of the respiratory tract."

A substance in liver, and in some commercial liver extracts used for treatment of pernicious anemia, is effective in fighting shock due to burns, was discovered by Dr. Myron Prinzmetal, Dr. Oscar Hechter, Dr. Clara Margoles and George Feigen, of the Cedars of Lebanon Hospital and the University of Southern California, in experiments with rats. The antishock substance in liver is not the same as the anti-anemia principle. Efforts are now being made to isolate it.

War workers whose jobs require "difficult muscular effort" and who can not because of local food and eating-place conditions obtain adequate diets should be given doses of the vitamin B complex to keep up their strength and work output, it appears from the report of studies at the Northwestern University Medical School by Dr. Clifford J. Barborka, Dr. Eliot E. Foltz and Dr. Andrew C. Ivy, who is now on leave serving as scientific director of the Naval Medical Research Institute, Bethesda, Md.

Decreased work output, tired feeling, lack of pep and appetite, and leg pains occurred when university students were put on a B deficient diet such as large numbers of workers may be eating. Adding the B complex to the diet restored work output to efficient levels and banished the other symptoms.

GERMAN MEASLES

GERMAN measles, a mild and rarely fatal childhood ailment, is giving health authorities a new puzzle. City health officers report to the U. S. Public Health Service that in certain cities a much larger proportion of this type of measles than of true measles has been occurring. Health authorities are wondering whether the increase means the disease is also becoming more serious.

In New York, for example, there were 1,000 more cases of German measles than of true measles during the first three months of the year. Never before have New York City's health department records shown a larger proportion of German measles than of the other kind. For more than 20 years, German measles cases have averaged less than 15 per cent. of the total number of cases.

Los Angeles reports a similar situation. Last year there were 1,323 cases of German measles and 10,343 cases of true measles in that city. This year the figures were

An Impressive Record

FINCH and TREWARTHA'S ELEMENTS OF GEOGRAPHY

Physical and Cultural

By VERNOR C. FINCH and GLENN T. TREWARTHA

Professors of Geography, University of Wisconsin

Second edition. 823 pages, 6 x 9, illustrated. $4.00

Teachers everywhere are finding that the new second edition of this successful standard text is admirably suited to pre-meteorological courses, AST courses, and AAF courses. The following institutions have already adopted the new edition of *Elements of Geography*.

University of Alabama (AST)
Albion, Idaho, Teachers College (AAF)
Allegheny College (AAF)
Amherst College (Pre-met.)
Alva, Okla., Teachers College
University of Arkansas (AAF)
Bellingham, Wash., College of Education
Bethel College
Birmingham-Southern College (AAF)
Bowdoin College (Pre-met.)
Bridgewater College
Brigham Young University
Brockport, N. Y., State Normal School
Brown University (Pre-met.)
University of California
University of California at Los Angeles (AST)
Canyon, Texas, Teachers College (AAF)
Cleveland Sisters College
Carleton College (Pre-met.)
Carnegie Institute of Technology
University of Cincinnati
Clark University
Colby College
Columbia University
Cornell University (AST)
Compton Junior College
Cumberland College
Davidson College (AAF)
Dartmouth College (Navy V-12)
Denison University (Pre-met.)
Drake University (AAF)
Drury College (AAF)
Duquesne University (AAF)
Elizabeth City, N. C., Teachers College
Ellensburg, Wash., Coll. of Ed. (AAF)
University of Georgia (AST)
Greenbrier Military School
Geneva College (AAF)
Hamilton College (Pre-met.)
Hastings College
Harris Teachers College, St. Louis
Haverford College (Pre-met.)
High Point College
Indiana University (AST)
Indiana Central College (AAF)
University of Illinois
University of Iowa (Pre-met.)
Jamestown College (AAF)
Knox College
Louisiana State University (AST)
Kenyon College (Pre-met.)
Long Beach Junior College
University of Maryland (AST)
Massachusetts State College (AAF)
McMaster University
University of Michigan
Michigan State College (AAF)
Michigan College of Mines
Middlebury College
University of Minnesota (Pre-met.)
Mississippi State College (AAF)
University of Missouri (AST)
Monmouth College
Montana State College (AAF)
New Jersey State College for Women
New Mexico A. & M. College (AAF)
University of Nevada (AAF)
University of North Carolina
Northwestern University
University of Oklahoma
Ohio State University (AST)
Oklahoma A. & M. College
University of Oregon
Otterbein College
Oberlin College
Oshkosh, Wisc., Teachers College (AAF)
Pennsylvania State College (AST)
University of Pittsburgh (AAF)
Plattsburgh N. Y. State Normal School
Pomona College (Pre-met.)
Potsdam, N. Y., Teachers College
Princeton University
Principia College
Reed College (Pre-met.)
San Diego State College
St. Bonaventure College (AST)
St. Vincent's College (AAF)
San Francisco State College
Slippery Rock, Pa., Teachers College
Springfield, Mo., Teachers Col. (AAF)
Superior (Wisc.) Teachers Col. (AAF)
Texas A. & M. College (AST)
Texas Technological College (AAF)
University of Tennessee (AAF)
Tennessee Polytechnic Institute (AAF)
University of Toledo
Union University (AAF)
Valley City, N. D., Teachers College
University of Utah
Vanderbilt University (Pre-met.)
Weber College
Washington University (AST)
Washington State College
West Virginia Wesleyan College (AAF)
University of Wisconsin (AAF)
University of Wichita (AAF)

Send for a copy on approval

For teachers whose courses cover only physical geography, the publication of Part One of this text as a separate volume is a real convenience.

PHYSICAL ELEMENTS OF GEOGRAPHY

641 pages, 6 x 9, illustrated. $3.50

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C.2**

almost the same for the two diseases: 2,163 cases of German measles, 2,607 cases of true measles.

The puzzling situation is worrisome because a similar increase in German measles cases in England recently was accompanied by alarming complications of this ordinarily harmless sickness. Encephalitis, the serious brain inflammation, popularly called sleeping sickness, was one of the complications.

No such complications have been reported so far, in New York City at least, but if the disease is becoming more prevalent, health officers naturally wonder why and whether the increase means that the causative germ has grown more virulent and may cause a more serious kind of sickness as well as more cases.

THE UNITY OF MIND AND BODY

IF every labor leader as well as every manager of industry realized that the hands that do the work and the minds that also work and plan are parts of the human body that depend upon each other, present labor difficulties would come closer to solution in the opinion of Dr. William E. Ritter, emeritus professor of biology of the University of California and honorary president of Science Service.

"The present serious outbreak of labor troubles must depend in part for its remedy on education, regardless of what may be undertaken by legislation and other political means," Dr. Ritter said. "As the discussion of the ideals of unity have been carried on, these refer to social, national and international unity. But from the educational point of view, perhaps the most important thing is the unity of the individual himself. No aspect of this is more crucial than that of the age-old disruptive duality of mind and body. So far as philosophy and theology are concerned, the individual is a house divided against itself. Psycho-biology calls attention, however, to the fact that mind and body, with hands as a climatic aspect of the body, form a unity of such a nature that the attempt to separate them can result in nothing less than intellectual and spiritual disintegration.

"If every person who should become a leader in industrial labor were to be adequately conscious of what he and every one of those whom he leads really is—a unit—his attitude would be quite different from what is now being manifested in labor troubles. This would be equally true of owners and managers of the industries. It appears that there would be a basis for the leaders of the two aspects to get together for considering their mutual interests and their disagreements. The meliorating conditions would not be applicable only to economic problems, but to all political organization and effort so far as government has to do with economic and industrial matters."

Dr. Ritter explained that recent investigation in psychobiology has shown that the cooperative activity of all the most important parts of the organism, head and hands with the rest, has a scientific basis. If we had not human brains and mind, we would not have human hands and if we had not human hands we would not have human brains and mind.

The skilled surgeon using his head and hands in combination is just as much a laborer as the man or woman who works as a mechanic in the production lines of bombers and tanks and other machines. Dr. Ritter pointed out that both of them would be unable to do their tasks in life if it were not for the fact that they use their heads and hands in combination.

ITEMS

WHEAT harvesting has moved up the map to the middle of the great grain belt, and is now in progress as far north as Nebraska and central Illinois, the regular weekly survey of the U. S. Weather Bureau indicates. The crop looks good—better than early estimates would have warranted. Farther north, the grain is ripening in Minnesota and Washington, and heading up well even along the Canadian boundary. At the opposite end of the country, cotton is doing well on the whole, though balanced growth is hampered by too much rain in Georgia and South Carolina, and in Oklahoma chopping is behind schedule because of labor shortage. Of the major crops, corn is the only one not justifying at least moderate optimism. Too much rain made planting too late over large areas in the central states, so that everywhere the unusual spectacle presents itself, of cornfields just sprouting side by side with other cornfields already in tassel.

SIGNS that an epidemic of infantile paralysis may be brewing for this summer appear in reports from Southwestern states especially to the U. S. Public Health Service. For the week ending July 3, latest for which figures are available, the total number of cases reported from all states and the District of Columbia was 190. The increase over the previous week's total of 136 cases is made up of increases reported from Texas, where the cases jumped from 39 the week of June 26 to 80 the week of July 3, and Oklahoma, which had an increase from 8 cases to 23. Infantile paralysis cases are expected to increase at this season, but the total number of cases reported since the first of the year was larger, on June 26, than for the same period of any year since 1934. The total for the first six months was 894, of which more than half were reported from California and Texas. In California the cases seemed to be concentrated in Los Angeles County and other southern counties. For the week ending July 3, however, this state reported 57 cases, which is one less than for the previous week. No other state reported more than five cases for the week of July 3.

MECHANIZED mass transplanting of tree seedlings has been successfully carried out at Muskegon, Mich., by using a machine originally designed for setting out celery seedlings slightly modified to accommodate the differently shaped and rooted young trees. During the past season nearly a million and a quarter pine seedlings were set out by the new method, at an over-all cost of 46.8 cents a thousand. Machine transplanting promises to do a great deal toward keeping up the necessary propagation of new forest stock in spite of lack of labor needed for setting out the seedlings by the old hand method. Each machine is operated by a crew of three, one man and two women. Details on the new machine and its operation will be presented in the forthcoming issue of the *Journal of Forestry*.

McGraw-Hill Books of Unusual Interest

So You Want to Be a Chemist?

By HERBERT COITH. 128 pages, 5 x 7½. $1.50

The manifold activities of the chemist and chemical engineer in industry—how they work and what they can accomplish—are clearly outlined in this helpful, stimulating, and thoroughly readable new book. Illustrating his points with numerous examples, the author discusses the qualities that make for success in the industrial fields in which the chemist and chemical engineer seek to build their career. The book shows how the chemist fits into the scheme of things, where his fields of usefulness lie, and how his work is related to that of other people.

The Thermodynamics of Firearms

By CLARK S. ROBINSON, Massachusetts Institute of Technology; Lt. Col., Ordnance Reserve, U. S. Army. 179 pages, 6 x 9. $2.50

This important new book places internal ballistics on a sound theoretical basis by means of thermodynamics. The author covers the behavior of propellant explosives in firearms in an elementary manner intended for the beginning student rather than the expert. The book includes chapters on basic stoichiometry, basic physical chemistry, heat of explosion, heat capacity of powder gases, ignition of propellant powders, rate of explosion, loading density, recoil, flash and smoke, measurement of propellants, measurement of temperature, closed chamber experiments, etc.

The Structure of Metals. Crystallographic Principles, Techniques and Data

By CHARLES S. BARRETT, Carnegie Institute of Technology. *Metallurgy and Metallurgical Engineering Series.* 563 pages, 6 x 9. $6.00

The author of this text and reference book covers structures, properties, and theories of metals and alloys and the crystallographic techniques of physical metallurgy. It includes extensive reviews of (1) preferred orientations and directional properties, (2) effects of cold work and annealing, (3) plastic deformation, (4) dislocation theory, (5) age hardening, (6) transformations, (7) alloy structures, (8) superlattices, (9) electron diffraction, and (10) stress measurement by x-rays.

The Physics of Metals

By FREDERICK SEITZ, Carnegie Institute of Technology. *Metallurgy and Metallurgical Engineering Series.* 328 pages, 6 x 9. $4.00

Here is an entirely non-mathematical treatment of the developments of the physics of metals that have taken place in the past fifteen years. It is based on a series of lectures given to metallurgists and physicists at the University of Pennsylvania. The topics include the structure of metals, factors determining the stability of alloys, the theory of plasticity of metals, diffusion in metals, the theory of iron-carbon alloys, the electron theory of solids and its applications to cohesion, magnetism, and conductivity.

Laboratory Manual for the Chemical and Bacterial Analysis of Water and Sewage. *New third edition*

By FRANK R. THEROUX, EDWARD F. ELDRIDGE and W. LEROY MALLMANN, Michigan State College. 274 pages, 5½ x 8. $3.00

As in previous editions of this widely known manual, the authors provide the civil engineer with the procedures for all the usual tests made in the water and sewage plant laboratories as well as many special tests required for stream surveys and trade water analyses. The new edition contains methods of determining fluorides, iodides, chloramines, chlorine break-point, coagulation dosages, etc.

Practical Physics

By MARSH W. WHITE, Editor, KENNETH V. MANNING, and ROBERT L. WEBER, The Pennsylvania State College, and R. ORIN CORNETT, Harvard University. *The Pennsylvania State College Industrial Series.* 365 pages, 6 x 9. $2.50

An elementary, practical, and abbreviated text in introductory general physics, with primary emphasis upon those aspects of the subject that are of immediate use in industry and technical work. The book is designed to utilize in a logically progressive manner the simple mathematical material needed, enabling the student to review the mathematics concurrently with the physics.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C.2**

SCIENCE NEWS

Science Service, Washington, D. C.

SICILY

MANY Sicilian cities are centuries old; a few are on the sites of ancient colonies established by Greeks and other eastern peoples centuries before the birth of Christ. The island abounds in archeological monuments of both its ancient and its medieval civilization.

The great majority of the 4,000,000 Sicilians on the island live in cities and towns rather than on farms or in rural villages. It is an old custom dating back to colonial and medieval days when the almost constant danger of warfare required concentrated populations for self-protection. The density of population is over 400 persons per square mile. The island is about the size of New Hampshire; it is only one fifth as large as North Carolina but has nearly a half million more people than that state. Even if its farming people lived on their farms, its large population in proportion to its area would still compel it to be a country of cities.

The immediate interest in the Sicilian cities is in those in the present combat area. Of these Pachino deserves first mention as it was in the center of the invasion line. It is on Cape Passero at the extreme southeasterly tip of Sicily, and from it the coast lines extend north to the Strait of Messina, and northwesterly to form the south or southwestern coast. It is along the coast from Pachino to Messina that many early Greek colonies were established.

Pachino had a pre-war population of approximately 21,000 persons. Northward less than ten miles is the railroad junction Noto; population, 30,000. Then in order are Syracuse (53,000), Augusta (20,000), Catania (252,000), Acireale (37,000), Giarre (25,000), Taormina (8,000), and Messina (202,000) only a few miles from the Italian mainland.

Syracuse (Siracusa in Italian), on the enclosed bay called Porto Grande, has one of the best natural harbors in all Italy. It is supposed to have been established by the Corinthians about seven and a half centuries before the birth of Christ. It contains many objects of historical interest. Augusta has an excellent harbor from which much of Sicily's commercial salt was shipped in pre-war days.

Catania, 35 miles north of Augusta, and the second largest city on the island, was the second busiest shipping port before the war. Sulfur, citrus fruits and products, vegetable oils and wines were its principal commodities. Stretching to the north, west and south are extensive plains, probably the most extensive plains of Sicily. Like Syracuse, it is an ancient city, dating back to 729 B.C. when it was established by the Chalcidians.

Acireale, Giarre, Taormina and Messina lead along the narrow coastal plain between the famous volcano, Mt. Etna, the Peloritan Mountains and the Mediterranean Sea.

Along or near the south or southwest coast from Pachino are the cities of Pozzallo (10,000), Scicli (22,000), Comiso (30,000), Vittoria (38,000), Gela (33,000), Licata (30,000), and Agrigento (30,000). Ragusa (50,000) is inland some 15 miles from the coast and a few miles east of Comiso.

Agrigento is another ancient city with many historical monuments. It is but a few miles from Porto Empedocle (15,000) and is the center of much of the sulfur business of Sicily. It is close to the junction of the coastline railway and an interior railway that crosses Sicily through the sulfur mining country to Catania on the east coast.

Landing beaches used by American forces are along this coast. Enemy aviation fields at Pozzallo, Comiso, Gela, and Porto Empedocle are reported to be now in the hands of the Allies. Gela is the site of a colony founded by the Dorians from Rhodes and Crete in 689 B.C.

MARTINIQUE

MARTINIQUE, Guadeloupe and the five small islands in the French West Indies group are relatively small in area, densely populated, and produce little of value to the Allies, but they hold important strategic positions between the Atlantic and the Caribbean. It will probably be necessary to send food supplies to them to help out in their present shortage. In return America may get limited quantities of dye-woods, resins, tanning materials and medicinal plants, and possibly some sugar, coffee and rum.

The value of the French West Indies to the Allies is military. Since December, 1940, when George Robert was named the Vichy High Commissioner of the islands and of French Guiana on the South American mainland, his jurisdiction has been a menace because of the danger of the use of the islands as an Axis base for action against the Americas. With the change in government the danger is removed.

The French West Indies have a total population of nearly 600,000 persons, only five per cent. of whom are white. Their total area is about the same as that of Rhode Island. Living is obtained largely from the soil. Sugar, coffee, rum, cocoa and bananas were shipped to France in pre-war days. Small amounts of salt and sulfur were also exported.

With an average of about 650 persons per square mile, and much of the area covered with forests of little commercial value, life has been sustained at a level far below American standards. Lack of cash formerly obtained from exports, together with lack of shipping, has prevented the obtaining of needed foods. Sugar and coffee without breadstuffs, even when bolstered by rum, is a poor diet.

Martinique is on the direct air route from Natal, Brazil, to Miami, Fla. It is the half-way point. It is reported to have a good air field which can be easily improved. It has an excellent harbor at Fort de France. It is in this harbor that three French warships and 140,000 tons of merchant shipping have been lying for nearly three years. All these ships will now become available to the Allies.

WILEY

NEW WILEY BOOKS

Ready in July

TREATMENT OF EXPERIMENTAL DATA

By ARCHIE G. WORTHING, *University of Pittsburgh.* and JOSEPH GEFFNER, *National Steel Company.*

This book is designed primarily for physicists, chemists, and engineers. It tells how to set up tables, including instruction on the use of legends; how to prepare graphs giving sufficient descriptive information so that they may be read easily; how to set up equations; how to determine, express and apply precision indexes, and similar matters.

Approximately 365 pages; 108 illustrations; 6 by 9; $4.50

OPTICAL CRYSTALLOGRAPHY

By ERNEST E. WAHLSTROM, *Associate Professor of Geology, University of Colorado.*

"Optical Crystallography" outlines the theory of the passage of light through crystals and fragments and describes in detail the construction and manipulation of polarizing microscopes and accessories. Emphasis is placed on the determination of optical properties of crystals and fragments in immersion media. The book is fully illustrated.

Approximately 224 pages; 232 illustrations; 6 by 9; $3.00

SEMI-MICRO QUALITATIVE ANALYSIS

By JAMES T. DOBBINS, *Professor of Chemistry, University of North Carolina.*

In this book the author endeavors to maintain a balance between the theoretical aspect of qualitative analysis and the laboratory work. Note particularly these important features: (1) a set of experiments illustrating the fundamental principles; (2) a complete systematic scheme of separation of the anions; (3) shortening of the time required for a complete analysis by elimination of as many separations as possible.

Approximately 386 pages; 5½ by 8½; $3.00

CHEMICAL SPECTROSCOPY

By WALLACE R. BRODE, *Professor of Organic Chemistry, the Ohio State University.*

A textbook for the use of those dealing with spectrographic analysis of materials and other applications of emission and absorption spectroscopy. While written primarily from the chemical standpoint, it will be found useful also by students of physics, the biological sciences, metallurgy and engineering. The new edition reflects the marked improvement that has taken place in recent years in the methods of spectro-chemical analysis.

Second Edition; Approximately 679 pages; Illustrated; College Edition $6.50

FUNDAMENTAL RADIO EXPERIMENTS

By R. C. HIGGY, *Assistant Professor, Department of Electrical Engineering, Ohio State University.*

This book describes 32 basic experiments or tests in electricity, electronics, and radio with a full explanation of principles involved as well as procedure to be followed in the laboratory. Sufficient theory is indicated to explain the tests to be performed. Equipment suggestions are presented throughout the experiments and in the appendix, which should assist in following the indicated tests with a minimum of equipment. A large number of circuit diagrams are included.

Approximately 100 pages; 71 illustrations; 5½ by 8½; Probable Price $1.50

JOHN WILEY & SONS, Inc., 440-4th AVE., NEW YORK

The French fighting ships that have been tied up in the French West Indies will be useful additions to the fleets of the Allies, though they will require drydocking to rid their bottoms of thick growths of barnacles and tropical seaweed, and would probably profit by a general overhauling. Ships' machinery standing idle deteriorates more rapidly than it does in use.

The aircraft carrier Béarn, which carries 40 planes, is the chief prize. Her rated speed of 21.5 knots is slow, as modern carriers go, but it is great enough to fit her into a formation of older-type battleships, and more than enough for convoy duty.

The cruisers Emile Bertin and the Jeanne d'Arc are in the 6,000-ton class and carry six-inch guns in their main batteries. Both will undoubtedly require additions to their light anti-aircraft armament before they can go into action under present-day fighting conditions.

When the Béarn tied up at Martinique, she set ashore 105 American-built fighter planes which she was ferrying to France at the time of the republic's fall. These have remained at Fort de France since 1940, sheltered only by tarpaulins. It is highly improbable that they can be put in shape to fly without a good deal of reconditioning. They are now of course obsolete for first-line purposes, but might be good for patrol, observation and similar uses.

A PORTABLE MERCURY FLASH LAMP

A NEW compact high speed electronic light unit has been developed by the engineers of the General Electric Laboratory, with the assistance of S. Lawrence Bellinger, which can take photographs with an exposure of only one-millionth of a second. High speed photographs taken in recent years are only one thirty-third as fast as this new unit.

A portable box 10 inches square, weighing under 20 pounds and containing a mercury lamp about the size of a cigarette constitutes the entire device. The light source on the front of the box resembles an auto headlight and can be operated either manually by means of a push button, by electrical contacts or by a phototube and preamplifier. It will illuminate an area of twenty square feet with sufficient light intensity to photograph the fastest moving objects.

Some features of this new high speed unit are its standard replaceable electrical parts, together with one electronic tube and a 100 watt Mazda mercury lamp. It can be operated on an ordinary 115 volt alternating current household lighting circuit. The current is rectified by an electronic tube and then used to charge a capacitor which serves as a sort of electrical storage tank. There is enough power accumulated in three seconds to operate the lamp at full intensity. The energy used in each flash is so slight that it is only sufficient to light a 40 watt lamp one-tenth of a second. The small mercury lamp has a life value of one second, which makes it good for one million exposures. This would be equal to 500 years of an average newspaper photographer's work. Lamps of this type are now being used as high-intensity light for illuminating airports, television, motion picture studios and various other means.

Although complete experimental tests have not been made, due to the pressure of war work, photographs have been taken of high-speed machinery such as turbines and supercharger parts. A "still" photo of a wheel revolving at 70,000 revolutions per minute has been taken with this new device.

ITEMS

A FINE new potato variety named Mohawk is to be made available to the public under the auspices of the U. S. Department of Agriculture. Seed stock for professional growers will be obtainable by next spring, and consumers should be able to find them in the market when the 1945 new-potato crop comes in. The Mohawk is described as long and smooth, without deep eyes, and excellent for baking. From the grower's angle, it presents the advantages of having good resistance to a number of troublesome diseases, and of producing high yields of uniformly sized and shaped tubers. The new variety was originated in Maine in 1935, as a cross between two already highly valued varieties, Green Mountain and Katahdin. For the past eight years it has remained under the near-anonymity of the designation "U. S. D. A. Seedling No. 46,000," while necessary test growings were being conducted.

IF there are ants in your plants, you can rout them with a chemical attack of P.D.B., according to entomologists of the U. S. Department of Agriculture. A big colony of these persistent insects can do a great deal of mischief, and is not easy to get rid of by ordinary means. P.D.B., or paradichlorobenzene, to spell it all out, is a crystalline chemical already familiar through its use to repel clothes moths. To use against ants, you simply punch holes a few inches deep in the soil over the nest, pour in a little P.D.B., and fill up with soil again. The crystals will diffuse a gas through the soil that will either kill the ants or make them so miserable that they will make haste to move elsewhere. Carbon disulfide is also effective against ants, but is slightly more difficult to use and is decidedly more dangerous to have on the premises because its vapor is somewhat poisonous, and both vapor and liquid are highly inflammable.

GERMS floating in air can be downed by using the Wilson cloud chamber, then counted and identified, was reported by Professor Carl E. Nielsen, of the University of California, at the meeting of the American Physical Society at Stanford University. Here is how it's done: As a piston in the box-like chamber is suddenly moved in such a way as to increase the volume, the air expands to fill the increased space. When a gas thus expands, temperature goes down. This causes the moisture in the air to condense on to the germs—or condensation nuclei. The dew-laden germs then sink to the bottom of the chamber where they are caught in a dish. Suggesting the new technique as another possible use of the cloud chamber which is ordinarily used to study ions, Professor Nielsen pointed out that most methods of air sampling remove an unknown percentage of the germs; the cloud chamber downs them all. Experiments conducted by Professor Nielsen show that dust particles of germ size also serve as condensation nuclei when the air is slightly supersaturated with moisture.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Three Important McGraw-Hill Books

INTRODUCTION TO PLANT PATHOLOGY. *New second edition*

By FREDERICK DEFOREST HEALD, Professor Emeritus of Plant Pathology, The State College of Washington. *McGraw-Hill Publications in the Agricultural Sciences.* 603 pages, 6 x 9, 246 illustrations, $4.00

In revising this well-known text, the author has retained his general plan of presenting a rounded, detailed introduction, in which the significant relationships of plant diseases to human affairs are stressed. The book discusses types of parasitic diseases, including those caused by fungi, bacteria, seed plants, and nematodes; virous diseases; and non-parasitic diseases. The author has incorporated in the second edition the results of recent researches on the diseases under consideration, especially as regards range or occurrence, life history, and control practices.

FUNDAMENTALS OF CYTOLOGY

By LESTER W. SHARP, Professor of Botany, Cornell University. 267 pages, 6 x 9, 176 illustrations, $3.00

Like the author's standard *Introduction to Cytology,* this textbook deals mainly with the structural and genetic aspects of the subject, but gives a simpler treatment that is better adapted to the use of beginners in cytology and cytogenetics. After a brief statement of the historical development of cytology and its position in biological science, the book takes up cells in relation to the organism and the structural and functional aspects of their organization; chromosome behavior; cytological features of the life cycles of animals and various groups of plants; modern cytogenetics; and use of cytological data in connection with problems of taxonomy and phylogeny.

SUCCESSFUL POULTRY MANAGEMENT

By MORLEY A. JULL, Professor and Head of Poultry Department, University of Maryland. 467 pages, 6 x 9, 187 illustrations. Textbook edition, $2.50

Here is a clear, helpful treatment of all the important problems faced in making the poultry enterprise a successful paying field of work. It provides easy-to-find, thoroughly usable, and concrete information, including an abundance of facts and data drawn from recent research and from the practical experience of poultrymen. How to produce eggs and poultry economically and how to market them to best advantage are discussed in detail. Special emphasis has been placed upon factors affecting the quality of eggs and chicken meat.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

SCIENCE NEWS

Science Service, Washington, D. C.

"WHITE NOISE" IN PLANES

METHODS for solving the problem of "white noise" in airplanes, which is apt to get whiter and therefore worse as faster planes are built, are reported by Commander Leon D. Carson, U. S. Navy, Dr. Walter R. Miles, Yale School of Medicine, and Dr. S. S. Stevens, of Harvard University, to the Federation of American Societies for Experimental Biology.

White noise is to sound what white light is to light. It is heard when all sound frequencies are added together, just as white light is seen when all colors, or light wave frequencies, are added together. The person on the ground listening to a plane high overhead hears only the low frequencies of the propeller. Inside of a really fast-moving plane, all the frequencies are heard together. Usually, the greater the speed, the whiter the noise and the more objectionable it is to the ear.

White noise is not only disagreeable but produces temporary deafness and spoils communications. Three remedies are suggested.

First, the noise in a plane can be made less white by improved aeronautical design or by application of sound absorbent materials.

Second, communications can be improved even in the midst of white noise by use of high-fidelity microphones and earphones, equipment which is not yet being widely used in airplanes though a few major improvements are in process.

Third, the microphone and earphones should be shielded from the noise by acoustic devices. Oxygen masks could be designed to include a microphone shield to cut out some of the white noise racket, and the ear can be shielded by an acoustic socket designed to provide a tight seal against the side of the head.

SICILIAN SULFUR MINES

CALTANISSETTA, Sicily, now reported to be in the hands of the Allies, is the center of the great sulfur industry of the island, and is the site of the Royal School of Mines. It is a city of 50,000 population, situated some 40 miles northeast of Agrigento, whose seaport is Porto Empedocle. The sulfur mines extend between Caltanissetta and Agrigento, and through the area to the south, an area conquered by American forces.

The largest Sicilian sulfur mines are probably the Campobello-Ravanusa, Zolfara Lucia, Crocca and the Ciavolotta. These are now all in American-held territory. In normal times Sicilian mines were producing annually from 300,000 to 400,000 tons. They were the world's principal source of sulfur until the Louisiana and Texas mines began to produce in quantity. American production is now well over 3,000,000 tons a year, enough to meet all war needs of the Allies. Germany particularly will feel the loss of the Sicilian sulfur when its stockpile supplies are gone.

England, perhaps, may now use Sicilian sulfur. Much cargo space from the United States would be released for other materials, and English ships taking vital supplies to the Mediterranean area would have return loads. Miners would be employed and thus kept off relief rolls. The sulfur would partially compensate for food and clothing that must be furnished the Sicilian civilian population.

DECREASE IN PELLAGRA AND BERIBERI

BREAD is now preventing disease. That cases of two vitamin hunger diseases, beriberi and pellagra, have decreased "markedly and unmistakably" in the wards of Bellevue Hospital, New York, during 1942 and 1943, the period when enriched white bread and flour became universally available in that city, was reported by Dr. Norman Jolliffe, of New York University College of Medicine, at the meeting called by the Food Distribution Administrator to consider compulsory enrichment of all white flour as a war measure.

Only a fourth as many patients with full-blown beriberi and only a third as many pellagra patients are seen now in the wards of this hospital as were there in 1939. This decrease is attributed to the bread enrichment program through which people are getting much more of the pellagra-preventing and beriberi-preventing vitamins, niacin and thiamin, than formerly.

Opposition, strongly vocal and somewhat unexpected, to the proposal for enriching all white flour, developed from representatives of the baking industry, who urged enriching bread and other flour products at the bakery, rather than at the mill. Increased costs to bakers; loss of prestige and hurt pride because the bakers have heretofore played a big part in pushing the enrichment program; and fear of possible loss or waste of vitamins either in stored flour or in manufacture of certain bakery goods were the chief reasons given.

Evidence that destruction of vitamins in flour under storage would not be serious, nor the loss in baking crackers and such items very large, was presented by those favoring enrichment at the mill.

Government authorities lean to enrichment at the mill because of greater ease of enforcement of the order. The large number of bakeries, many of them small, would make supervision of enrichment of bread and bakery goods extremely difficult.

Millers seem willing to take on the entire enrichment job. They are already enriching a large proportion of all flour and it is believed very few mills will need any extra equipment to enrich all white flour.

Flour should be enriched at the mill, according to Dr. Russell Wilder, chief of civilian food requirements branch of the Food Distribution Administration, because the fault has been with the flour, not the bread. Finely milled white flour loses important vitamins and iron in the milling process. Enriching flour at the mill or source, he pointed out, follows the logic of purifying the water supply of an entire city rather than doing the job in each home and public building.

The proposed new order for enrichment of all white flour will not include such flour products as sphagetti and macaroni which are made from a special flour called semolina.

Whether all or only part of white flour is to be enriched, it may be possible to distinguish it after October 1 by a very faint creamy tinge due to the vitamin, riboflavin, which will be a must ingredient in all enriched flour and bread after that date. Riboflavin has a clear yellow color. In flour and bread, however, the color will be so diluted that most consumers probably will not notice it.—JANE STAFFORD.

TREATMENT OF BURNS AND WOUNDS

THE Office of Civilian Defense has issued new recommendations for the first aid treatment of burns and wounds. The American Red Cross, it is understood, will probably issue similar new directions on burn treatment.

For burns, the advice is to use sterile boric acid ointment or petrolatum (sterile vaseline), instead of the previously recommended tannic acid jellies and ointments. This follows recommendations of the division of medical sciences of the National Research Council for the armed forces. The most serious objection to tannic acid is that it almost immediately forms a scab or hard coating over a deep burn. This seals in the germs, dirt and other contamination which usually get into serious burns. Dangerous infection may result.

For wounds, more cautious use of the sulfa drugs in civilian casualties is advised. Civilian injured, it is pointed out, are likely to include persons of all ages and states of health, whereas the military wounded are in a select group of healthy young men. The danger of poisonous effects from sulfa drug treatment is therefore greater among civilian injured.

Sulfa drugs are not recommended for first aid. Unlike the war wounded, the civilians can usually be under treatment in a hospital within a short time. Once in the hospital, the sulfa drugs can be used under medical supervision with proper precautions.

PROPOSED PHARMACY CORPS FOR THE ARMY

A BILL setting up a Pharmacy Corps as part of the Army Medical Department has been passed unanimously by Congress. Under direction of seventy-two commissioned pharmacists, the Corps would be aimed at giving the Army the best pharmaceutical service available. The Corps would handle all Army medicines, from purchase, through storage, shipment and compounding, to the final dispensing.

Congressional hearings brought out that in the past, men with only a few months of pharmacy training have operated some Army dispensaries, while men holding degrees in pharmacy worked under them. Numbers of inductees are said to have been put through a 90-day training period in pharmacy to fill the Army's needs, while at the same time registered pharmacists were being inducted into the ranks.

Despite controversies aired at the hearings, some Army authorities believe that, in view of the high standards of present Army drug supplies, revamping pharmaceutical service should wait until after the war. Officials of the American Pharmaceutical Association counter with the statement that putting pharmaceutical service under a Pharmacy Corps in the hands of registered pharmacists will be more efficient and give a better check on the quality of Army medicines.

Should the President sign the bill, it will be then up to the Surgeon General's office to decide what course of action is best for the Army.

ITEMS

A PROCESS for extracting crude oil and a gasoline substitute from pine tree stumps has been perfected by a young instructor in chemistry of Fukien Christian University in China. This new process is a military secret for the present but the Chinese Army is already using the gasoline substitute obtained from the hundreds of thousands of tree stumps left as a result of timber exportation from the Fukien Province's forests. Another achievement is the development of two new varieties of rice which yield 40 per cent. more grain than the local rice of that section.

BOTANISTS in London are watching areas of bomb-scarred and fire-scorched soil in the city, to see if perchance the famous London rocket, a two-foot plant with whitish, four-petaled flowers, may make its first appearance in something over 270 years. This wild plant sprang up abundantly in the ruins after the Great Fire of 1666, which devastated the city when it was much smaller than it is now. Expectations that it may reappear are based on the fact that already nearly 100 species of plants strange to the city have sprung up in bombed and burned areas, where the chemical properties of the soil have been changed in ways that permit them to grow.

SHOOTING billions of electron bullets per second, the electronic diffraction camera is being used for a new scientific attack on rust and corrosion. These silent saboteurs of metal war equipment are being investigated at the Westinghouse Research Laboratories by Dr. Earl A. Gulbransen through studies of the atomic structure of coatings that "grow" on steel, aluminum and copper when these metals are exposed to air or corrosive chemicals. "Just as some types of bacteria are beneficial to human beings," Dr. Gulbransen explained, "some of these oxide coatings protect the metal underneath them. Others, of course, like rust, are harmful. With this electronic camera, we are testing new theories as to how these coatings are formed." The camera bounces electrons off a highly polished button of aluminum or steel on which an oxide coating is being built up. Electrons richochet off different faces of the molecules of the coating, and strikes a strip of photographic film. A design is formed on the film from which atomic structure can be interpreted. Such research points the way toward development of longer-wearing bearings and cylinders for plane and auto engines, better tin cans and cheaper stainless steel.

Physics

DUFF (and Contributors)

630 Illus.
715 Pages
$4.00

Physics, 8th Edition

A standard text for students of science and engineering. Written by collaboration of eminent physics teachers. Edited by A. Wilmer Duff, Worcester Polytechnic Institute

FOLEY

470 Illus.
757 Pages
$3.75

College Physics, 3rd Edition

Widely adopted for use by students in the arts and sciences, this text is also giving excellent results in the accelerated program. It stimulates the scientific method of reasoning. By A. L. Foley, Indiana University

DUFF and PLIMPTON

86 Illus.
173 Pages
$2.75

Elements of Electro-Magnetic Theory

A very teachable text for a brief intermediate course. By A. Wilmer Duff and S. J. Plimpton, Worcester Polytechnic Institute

HECTOR, LEIN and SCOUTEN

Ready Soon
Probable
Price
$4.00

Electronic Physics

This is a new text. Modern explanations are given from the start and practically all electrical phenomena are presented from the electron-proton point of view. Most of the illustrations are in color. By L. Grant Hector, Herbert S. Lein and Clifford E. Scouten

WEBER

183 Illus.
430 Pages
$4.00

Temperature Measurement and Control

It presents the basic principles for the intelligent use and extension of the methods of temperature control and measurement. By R. L. Weber, Pennsylvania State College

STRANATHAN

211 Illus.
571 Pages
$4.00

The "Particles" of Modern Physics

A study of the fundamental particles of physics designed for a college course at the junior or senior level. Experimental evidence for each concept is stressed. By J. D. Stranathan, University of Kansas

PISTON

100 Illus.
233 Pages
$3.00

Meteorology, 2nd Edition

Material for a semester course in the science of the weather is offered in this text. By D. S. Piston, Twining Laboratories Inc., California

CULVER

128 Illus.
194 Pages
$2.50

Musical Acoustics

Designed for a semester course for students majoring in music, this text presents an accurate, modern survey of the subject in comprehensive form. By C. A. Culver, Carleton College

MASSA

107 Charts
228 Pages
$4.00

Acoustic Design Charts

A comprehensive source of quantitative design information which serves as a quick reference guide for those interested in the theory, design or construction of electro-acoustic apparatus. By Frank Massa, Brush Development Company, Cleveland

MORRISON and MORRISON

189 Illus.
235 Pages
$2.00

Experimental Physics

A comprehensive manual in experimental physics for college students. By E. Morrison and S. E. Morrison, Michigan State College

Philadelphia 5 **THE BLAKISTON COMPANY**

Two Important New Texts
in the
Metallurgy and Metallurgical Engineering Series

Under the Consulting Editorship of

ROBERT FRANKLIN MEHL

Head, Department of Metallurgical Engineering;
Director, Metals Research Laboratory,
Carnegie Institute of Technology

THE PHYSICS OF METALS

By FREDERICK SEITZ, Professor of Physics and Department Head, Carnegie Institute of Technology. 331 pages, 6 x 9, illustrated. $4.00

Here is an entirely non-mathematical treatment of the developments of the physics of metals that have taken place in the past 15 years. It is based on a series of lectures given to metallurgists and physicists at the University of Pennsylvania. The topics treated include the structure of metals, factors determining the stability of alloys, the theory of plasticity of metals, diffusion in metals, the theory of iron-carbon alloys, the electron theory of solids and its applications to cohesion, magnetism, and conductivity.

The book also contains a summary of the theory of dislocations and the role they play in determining plastic flow.

THE STRUCTURE OF METALS. Crystallographic Principles, Techniques, and Data

By CHARLES S. BARRETT, Associate Professor of Metallurgical Engineering, Carnegie Institute of Technology. 563 pages, 6 x 9, illustrated. $6.00

This is a text and reference book covering structure, properties, and theories of metals and alloys and the crystallographic techniques of physical metallurgy. It includes extensive reviews of (1) preferred orientations and directional properties, (2) effects of cold work and annealing, (3) plastic deformation, (4) dislocation theory, (5) age hardening, (6) transformations, (7) alloy structures, (8) superlattices, (9) electron diffraction, and (10) stress measurement by x-rays.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C.2

SCIENCE NEWS

Science Service, Washington, D. C.

THE DISCOVERY OF QUARTZ CRYSTAL DEPOSITS AND NEW PRODUCTION METHODS

QUARTZ crystals, essential for military radio and radar apparatus, have finally been pushed off the "desperately needed" list by discovery of quartz deposits, by salvage of crystals formerly discarded, and by research successes that have increased the production of crystal oscillator plates more than a third. Supplies are still barely adequate, WPB reports, but only a few months ago it seemed as if there would be only half enough.

Prospectors tracked down every clue that might lead to the hiding place of one of the nation's most badly needed natural resources. Recently they have discovered deposits in North Carolina, Virginia and California. Experts from the U. S. Geological Survey are now pushing exploration in these and a dozen more western states. During the past year deposits of electronic-grade crystals also have been unearthed in Arkansas and hundreds of pounds of crystals have already been produced, put into war equipment, and sent on their way to fighting fronts.

Engineers sent to the scene are blowing the tops off two Arkansas mountains to get at the new sources. Thousands of pounds of crystals—good and bad—have been brought to light. Although quartz had been known to exist there for decades—the beautiful, transparent, six-sided crystals being sold to tourists as souvenirs—industrial production was not considered until urgent war needs developed.

Further search revealed favorable territory just northwest of Hot Springs, 30 miles wide and 100 miles long, stretching in a westerly direction almost to the Oklahoma border. Further prospecting is expected to discover hundreds of small workable deposits throughout this region for years to come. Government mineral experts consider the Arkansas find as a reserve, however, and warn that our entire domestic production probably will be only a small part of the quartz crystals needed. Experts and equipment have recently been sent to Brazil to expand production there. Deposits deep in the Amazon jungle remain our chief source of supply.

Meanwhile, research workers have made three quartz crystals do the work of four. They have developed new methods that add to the supply as effectively as the discovery of new deposits. Thinner saws for cutting the crystals into the wafer-thin plates were developed, saving much of the crystal that was formerly sawed away into useless dust. Then it was found that the crystals could be cut into still thinner slices, thus doing away with much wasteful grinding in the finishing operation. In use for only the past few weeks, the new cutting methods are producing at least a third more usable material.

Next the thousands of pounds of low-quality crystals that have been piling up in warehouses, discarded as unfit for electronic use, have been examined. Experiments showed special uses for some of these crystals and the huge amount of waste material on hand was converted into a usable stockpile.

More quartz crystals are needed. Quartz is among the world's commonest minerals. But the large, clear crystals required for radio purposes are rare. Amateur prospectors who want to help the war effort may send sample crystals, which they may discover lining cavities in rock or in the dirt and gravel near-by, to the Miscellaneous Minerals Division, War Production Board, Temporary R Building, Washington, D. C.

Only separate crystals as clear as glass are wanted, not clusters or grainy masses. Colored quartz, such as amethyst and onyx, can not be used. Each crystal must weigh at least a half pound; measured in inches such a crystal will be about an inch in diameter and three inches long. The whole crystal need not be perfect but large portions must be entirely free from specks, bubbles, lines, clouds or flaws of any kind. Good parts must be at least two cubic inches in size and at least half as large as the imperfect section, otherwise it is not practicable to saw out the good portions.—GLENN SONNEDECKER.

OIL FROM OLD WELLS

MORE oil from the nation's oil fields by less labor are the twin benefits of the electric pilot described by Dana G. Hefley and P. E. Fitzgerald, of Dowell Incorporated, Tulsa, Okla., in a report to the American Institute of Mining and Metallurgical Engineers. After primary oil has been pumped from a well by ordinary methods, the instrument is used to locate areas that are likely to contain secondary oil deposits, then puts acidizing chemicals into the right place where they help to get out additional oil.

Using acid to increase production of an oil well and to shorten the time needed for recovering oil has often been successful. But most of the acidizing methods used depend upon data about the well supplied by the geologist and engineer. In many cases, the zones specified were inaccurately located or the data were too meager for successful oil recovery. The electric pilot, however, can quickly locate the areas containing oil, and then chemicals can be introduced through the device into the desired zones. Much time and quantities of acid are thereby saved in getting the secondary oil from the wells. An electric circuit is completed and registers on an ammeter when contact of one or both electrodes of the electric pilot has been made with a conductor such as acid or salt water in the well; no current registers if the instrument contacts a non-conductor such as oil.

Thus in actual well application, the amount of fluid injection can be controlled by maintaining the proper acid-oil level through reading the changing fluid-interfaces. The use of the locator is valuable in acidizing many wells with high gas-oil ratios, high water-oil ratios, two or more "pay" zones, sands exposed above or below limestone, leaky casings and deepened wells.

Better oil recovery and improved operating technique has resulted from use of the electric pilot.

Successful

HYGIENE Third Edition

By F. L. MEREDITH, M.D.
Professor of Hygiene, Tufts College

183 Illus.
822 Pages
$3.50 (1941)

This book presents material of vital importance to every student. It appraises the health situations that exist in the life of individuals and peoples, then sets up objectives and instills a desire on the part of the student to do something about attaining them. Very timely is the chapter on diet which gives a splendid summation of the national and world situations and offers sound solutions to these problems. The chapter on food presents the newer knowledge on vitamins. The book is divided into six sections, as follows: Introductory—a discussion of the health situation in the United States. General plan of the body and working of its parts. Types of bodily disorders. Effective use of medical science. Health considerations, and finally, mental health. The material is well organized for the beginning college student and abundantly illustrated.

By the same author

Widely Used

THE SCIENCE OF HEALTH

138 Illus.
427 Pages
$2.50 (1942)

Written in easy, readable style, this book is designed for use in one-hour, one-semester college courses in hygiene. The following basic aims have been kept in mind: To give facts the student can use in making his own decisions in all health situations; to give opinions generally held by medical science; to weight the material properly giving each subject the space due its importance; to arrange the material so that its order and sequence would be educational in value, and to use scientific terminology in so far as it would help to clarify the student's thinking. The chapters on anatomy and physiology have been held to a minimum of space, while the treatment of nutrition and current health problems is unusually complete.

THE BLAKISTON COMPANY, Philadelphia—5

THE COST OF ELECTRIC LIGHT

ELECTRIC light costing only a tenth of what it does to-day and used lavishly in our homes is foreseen as a practical possibility, for thirty years hence, by Ward Harrison, of the General Electric Company, in a report to the Illuminating Engineering Society.

Our lighting of to-morrow may be as different from present day lighting as Edison's first incandescent lamp differs from present lamps. A 100-watt lamp of to-day gives us five times the light of a lamp of the same wattage in 1913 and at half the cost of current.

The best artificial light source of to-day, the fluorescent lamp, is less than one quarter efficient. Improvement in its efficiency will mean more and better light. Maintenance of candlepower and eliminating the starters now used on fluorescent lamps are only two of the refinements which the future may bring.

The greatest advantage of the fluorescent lamp, according to Mr. Harrison, is its superior quality of high-level local lighting, but future lighting promises to be many times brighter. Conquering glare and heat, still largely untouched by illuminating engineers, will be another step forward.

Since light is expected to be cheaper, future building designs will include light as part of the whole construction plan, emphasizing light itself, rather than lighting fixtures.

SOUTHERN ITALY

THE best time to visit southern Italy, according to German-published Baedecker's guidebook for tourists, is in the spring or in late September and October. The winters are unpleasant; the fierce rays of the Italian summer sun are enervating. The best route is overland by way of France, or by boat to Naples. No mention is made of the new route from Tunisia to Sicily, and so on to the many excellent landing beaches around the edges of the Italian boot.

Southern Italy, including the department or province in which Rome is situated, contains about 35,000 square miles of territory. This is a little less than the area of Indiana, and nearly three and a half times the size of Sicily. In pre-war days some 13,000,000 persons lived in this area, four fifths of them in cities and only a fifth on the land.

About one tenth of this population lived in Rome, and more than 920,000 in Naples. Over 210,000 lived in Bari, an east coast town with an important military airfield. Approximately 150,000 were in Taranto, one of Italy's most important naval bases, which is reported to have also an adjacent flying field. Reggio di Calabria, across the strait from Messina, Sicily, had a population of about 122,000. It is about 300 miles from Reggio to Naples by the west coast railroad, and 200 by air.

The Apennines, or Appennino Mountains, are scattered over half of the interior of southern Italy, their extension reaching to near Reggio. A western range follows the western coast two thirds of the way up to Naples. Coastal plains follow the southern coast and the eastern coast along the Adriatic Sea. The volcano Vesuvius is but a few miles from Naples.

The main railroads of southern Italy follow the coast lines. From Reggio Calabria one follows the west coast to Rome and beyond. Another follows the coastline along the sole of the boot, proceeding then up the Adriatic to northern Italy. Branch lines run into the interior, and a few lines connect the two coasts. But the direct route from the toe of Italy to the north is by way of Rome. The destruction of the great freight and passenger center in Rome, through which run all west side lines to the south, was a military necessity. It was a severe blow to the defense of the entire Italian boot.

ITEMS

THOUSANDS of scientific books are being sent to prisoners of war at their own request by the War Prisoners' Aid of the Young Men's Christian Associations. 3,17[illegible] volumes were mailed during the five months from last December to May, and expansion of the service is foreseen since shipping space is now provided more regularly. Each book is sent free of charge through the "Men of Science-Prisoners of War" Service, as the YMCA has termed it, to fill the needs of the individual. Due to the great number of prisoners desiring serious literature and the growing shortage of books in Europe, requests are continually received from the international YMCA organization in Geneva, Switzerland, and from the British Red Cross. Shipments have run the gamut of sciences from astronomy to zoology, plus the classics, philosophical and legal tomes, and the other humanities as well. Agriculture was at the head of the list with 422 requests; the social sciences were a close runner up with a total of 413. Language problems of men interned in a nation of foreign tongue may be reflected in the 385 volumes on languages mailed during the months just reported. Medicine and biology were also high on the list with 372 requests.

NEW aid to doctors trying to locate and remove foreign bodies such as coins and safety pins lodged in the lungs is expected from an x-ray machine newly installed at the University of Pennsylvania Hospital. The chief feature of the new x-ray machine is the miniature turntable incorporated in it which enables the doctor to change the patient's position so that the pictures can be made from any angle, even vertical, without lifting or turning the patient bodily. The machine is called a biplane fluoroscope because with it examinations can be made and x-ray pictures taken in both horizontal and vertical planes. It was made by the Westinghouse Electric and Manufacturing Company.

ANOTHER case where a war-necessitated "ersatz" material proves superior to its vanished predecessor is the bubbly rubber sponge much used for cushions, insulation and other purposes in pre-war days, now replaced by a new material known as plastic foam, which looks like packed snow and is claimed to be superior to the original rubber product. For one thing, it is lighter than balsa, as well as proof against fire and water, and so is well adapted for use in floats. Production at present is in limited quantities, and all that is being turned out goes into insulation for warplanes.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Just Published

NAVIGATION

By Lyman M. Kells, Willis F. Kern and James R. Bland
United States Naval Academy

580 pages, 6 x 9, illustrated. Textbook edition. $3.75

This important new text is also available in two separately published volumes:

Part I. Coastal and Inland Waterways Piloting. 288 pages, 6 x 9, illustrated. Textbook edition. $2.50

Part II. Celestial Navigation and Nautical Astronomy. Approximately 200 pages, 6 x 9, illustrated. Textbook edition. $2.00

Navigation presents a complete course in the subject, dealing with the best and the latest methods used in navigation practice. An outstanding feature of the text is simplicity obtained by logical arrangement of material and careful preparation for each development. Basic review material on mathematics has been selected so that the student will gain from it needed mathematical power while becoming familiar with essential concepts and procedures of navigation. Nevertheless, each navigational theory is given a thorough independent treatment. Illustrative examples, together with numerous figures and diagrams, are used to bring out all essential elements of a topic. Graded exercises follow each topic.

Chapter Headings

Fundamental Mathematics for Pilots
Instruments
Charts
Piloting
Navigation Aids, Rules of the Road, Tides and Currents
Ship and Plane Maneuvers
Review of Spherical Trigonometry
Sailings and Nautical Astronomy
Time
Air Almanac
Meridian Altitude
Fix
Nautical Astronomy and Star Identification
Appendix A. Logarithms
B. Range Finder
C. The Hagner Planetarium

Send for a copy on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C. 2

SCIENCE NEWS

Science Service, Washington, D. C.

PLANT TUMOR BACTERIA

TUMORS on plants, that are very much like animal tumors, even to the formation of cancerous dead areas within themselves and eventually killing the plants, are being studied by Dr. Philip R. White at the laboratories of the Rockefeller Institute for Medical Research at Princeton, N. J. They are unlike animal tumors in that they are started by easily detected bacteria, but they are like animal tumors in that they can be transplanted into previously healthy tissue—and these transplants do not need to have the originally causative bacteria in them to continue their malignant growth.

Dr. White's latest efforts have been in the direction of finding how these bacteria operate to start the tumorous growth. He has not got the whole answer yet, but he is able to report one or two interesting leads.

One thing he has discovered is that the bacteria can be robbed of their tumor-causing power by growing them on nutrient media containing the protein fraction known as glycine. Bacteria thus treated can live in the tissues of the host plant, but tumors do not develop at the point of inoculation. However, if the top of the plant is cut off, and the tissues around the infected spot are treated with a solution of one of the growth-promoting substances or hormones, tumors again develop, although bacteria taken from these new tumors are still unable to produce new tumors elsewhere unless they are again aided by growth-promoting hormones. But if bits of germ-free tumors are transplanted into healthy plants, they will develop into big and harmful growths. That is, even though the bacteria have been rendered harmless by themselves, they are still capable of being links in a chain of harmful development, that can go on afterwards by itself without them. As Dr. White phrases it, the plant's cells have undergone a "permanent and irreversible cancerization."

Another lead followed by Dr. White has been the suggestion that the bacteria themselves are not the cause of the mischief, but that they act as carriers of a virus, much as mosquitoes serve as carriers of the yellow fever virus. The hypothetical tumor virus, it was suggested, might then carry on in the plant tissues without further help from the bacteria.

To test this, Dr. White sought a plant species that could survive a degree of heat that is sufficient to kill known plant viruses. Such a species was not easy to find, but he located one finally, a garden flower known as the Madagascar periwinkle. This delicate-looking but really tough little plant can survive prolonged exposure to a temperature of 115 degrees Fahrenheit.

Inoculated with the tumor bacteria and held at this temperature for ten days, nothing happened; but when the temperature was lowered to an ordinary greenhouse level the tumors developed normally. In the meantime the bacteria themselves had disappeared—but before they died they managed somehow to bequeath to the plant tissues a heritage of abnormal growth.

ALLERGY AND APPENDICITIS

APPENDICITIS may be due to allergic reactions similar to those causing the symptoms of hay fever, asthma, hives and the like, is reported by Dr. L. O. Dutton, of El Paso, Texas, in the forthcoming issue of a new medical journal, the Annals of Allergy. This bi-monthly journal, published at St. Paul, Minn., is the official organ of the newly organized American College of Allergists. This new scientific body aims, among other things, to bridge the gap between doctors specializing in treatment of allergy, the many other practicing physicians "who are applying allergy to their practice," and the non-clinical scientists such as biochemists, pharmacologists, botanists and plant pathologists who contribute to knowledge of allergy and its management.

The theory that appendicitis is due to allergy does not, Dr. Dutton emphatically states, contradict the fact that it must be treated by surgery. Prompt diagnosis and prompt operation to remove the inflamed appendix before it ruptures and causes death-dealing peritonitis is required, regardless of whether or not the appendicitis was caused by allergy. The allergic theory, however, if proved valid and sound, "offers some hope of prophylaxis."

Scientists have never agreed on one single cause for appendicitis, he points out. In some cases the cause is mechanical obstruction due to fecaliths, kinks or adhesive bands. Functional obstruction due to swelling is supposed to occur frequently. Such swelling and engorgement of the appendix tissue is similar, Dr. Dutton points out, to the swelling which characterizes allergy in other conditions as, for example, hay fever. Careful study of over 120 cases of appendicitis and the appendices removed at operation strengthened Dr. Dutton in this theory which previous experience had suggested.

In 87 of these patients, moreover, 45, or more than 50 per cent., gave a history of definite hay fever, asthma or hives existing before the appendicitis attack. Although based on too few cases to be statistically reliable, Dr. Dutton says, the figures are nevertheless impressive in contrast with the fact that these three allergic conditions occur in less than 10 per cent. of the general population.

THE NEW MEXICAN VOLCANO

SCIENTISTS are not able to predict as yet when the new Mexican volcano, Paricutin, will stop erupting, was reported by Ralph R. Bodle, seismologist of the U. S. Coast and Geodetic Survey, who has made an inspection of the volcano.

Mr. Bodle met a native who was helping to evacuate the people of the little town of Paricutin partially covered by lava from the volcano. "Many learned people come here to study the volcano," said the native. "They write articles but with all their knowledge not one can tell you when the volcano is going to stop."

The government seismologist was on the spot to watch when the volcano let loose a new flood of lava in mid-June. The new phase of activity was ushered in by a

WILEY

NEW WILEY BOOKS

Ready Summer—Fall

GENERAL PHYSICS: A Textbook for Colleges

By OSWALD H. BLACKWOOD, *Professor of Physics, University of Pittsburgh.*

A textbook for the standard course in general physics for college students. Its content represents an amplification of the author's earlier book "Introductory College Physics." "General Physics" follows the same general structure as the older book, but the material is more comprehensive and more difficult. Simplicity of presentation, however, has been maintained, together with appropriate rigor.

Approx. 598 pages; 6 by 9; Probable price, $3.75

ELEMENTARY QUALITATIVE ANALYSIS

By BRUCE E. HARTSUCH, *Associate Professor of Chemistry, Michigan State College.*

The subject matter of this book is suitable for use in beginning courses in qualitative analysis. The material is written in a readable and understandable style, with detailed, step-by-step solutions of illustrative problems. Laboratory directions are included. The discussions are keyed to the level of the student's understanding.

Approx. 294 pages; 7⅝ by 10½ ; Probable price, $2.50

STATISTICAL ADJUSTMENT OF DATA

By W. EDWARDS DEMING, *Head Mathematician, Bureau of the Census.*

A practical textbook in statistical adjustment. Different kinds of problems are unified and brought under one general principle and solution—statistical procedures associated with curve fitting and other adjustments by least squares and skeleton table forms for numerical calculations. Suitable for courses in graduate chemistry, physics, sociology, agriculture, or biology.

Approx. 248 pages; 5½ by 8; Probable price, $3.50

PATHOLOGY IN FOREST PRACTICE

By DOW V. BAXTER, *Assistant Professor of Silvics and Forest Pathology, University of Michigan.*

An eminently practical treatment of the subject of forest pathology, designed to provide a working knowledge of the conditions which cause disease and of the practical measures which can be taken to reduce its incidence or its severity. The whole subject of pathology is presented from the "crop" or "purposeful" point of view, and so is integrated with other branches of forestry.

Approx. 596 pages; 6 by 9; Probable price, $4.75

INTERMEDIATE DIFFERENTIAL EQUATIONS

By EARL D. RAINVILLE, *Assistant Professor of Engineering Mathematics, University of Michigan.*

This book is designed for use in a course to follow the usual one in elementary differential equations. Emphasis is placed upon development of the student's technique. The book trains the student in the construction of computable solutions for specific differential equations. Applications to engineering problems are given. An introduction is offered to several topics of importance in the classical theory.

Approx. 221 pages; 5⅜ by 8⅛; probable price, $2.75

JOHN WILEY & SONS, Inc., 440-4th AVE., NEW YORK 16

strong earthquake motion that shook the whole countryside. The cone itself was obscured by a great cloud of dust. Then a third to a quarter of the cone collapsed due to lava forcing its way out under one side of the base. The lava flow continued for about ten days until it reached the village.

Mr. Bodle's studies show that earth shocks at the city of Uruapan about 15 miles distant from the volcano were almost continuous for some 20 days before the volcano began to form in a corn field on February 20. Some strong shocks that were felt on February 22, he believes, were due not to the volcano but to a large earthquake centering off the west coast of Mexico. Shocks were felt throughout the immediate region of the volcano for some days after the lava appeared.

Strangely enough, the shocks continued in one locality about five miles southwest of the volcano long after they had died out elsewhere. At this place, known as Pechu, in the foothills of Tancitaro mountain, the shocks continued until about May 7, when they nearly ceased. A field party surveying the earth's magnetism near the volcano under the direction of Nelson C. Steenland, of the U. S. Coast and Geodetic Survey, camped there on May 21 and felt three shocks which appeared to be related to explosions in the crater of the volcano.

In his exploration of the volcano Mr. Bodle noticed that the sand was hot at one place. Three or four days later a lava field had covered the site of his observations.

This caused him to credit the story heard in Mexico that before the volcano appeared, an Indian in whose field it started found that the ground was warm and went out there to sleep to ward off the chill of night air.

THE MEDITERRANEAN FISHING INDUSTRY

SARDINIA'S sardines, for the past two decades or so, have been consumed mostly in Italy. Small quantities were still being imported into America before the war to satisfy the taste of Italian-Americans who have a particular liking for this especially cured and packed-in-olive-oil little fish. The commercial sardines used in America come from the Atlantic and Pacific coasts, and are packed principally in Maine and California. Some have been imported from Norway, France and Portugal.

During the past year or so, fishing in the Mediterranean has practically ceased. Sicily and other Mediterranean islands and countries caught, packed and shipped much tunny, or tuna, in pre-war days. The Tunisia campaign brought this activity to a standstill. Other fish is more or less plentiful in the Mediterranean. With the collapse of Italy's war resistance, the industry may start again. Much food could be obtained from this great body of water.

Except for local consumption, commercial fishing was never a great industry in the Mediterranean. Pre-war Italy, including Sardinia, Sicily and a number of the smaller islands, landed about 50,000 to 60,000 tons a year. Northern African fishermen together slightly exceeded Italy's catch. Eastern Mediterranean Asiatic countries caught a few thousand tons. Data for Greece and other European nations are not available, but their catches were small and used only locally.

France and Spain carry heavy fishing activities. Together they landed nearly $88,000,000 worth of sea products a year, but only a small part of this was from Mediterranean waters. These figures do not add up to big business as do fishing figures in America.

There are possibilities, however. With the food shortage in all the Mediterranean countries that have been occupied by the Nazis, the fishing industry could be expanded far beyond its past extent. Modern methods would have to be introduced. The industry could well be assisted by the United Nations in order to save long hauls of other foods to relieve the underfed Mediterranean people.

ITEMS

A FAVORITE Mexican resort city for American tourists is adding science and culture to its attractions. Just a block north of Ambassador Morrow Street, named for the U. S. Ambassador who had a home in Cuernavaca, there is now a street that bears the name of the honorary president of the Mexican Academy of Sciences, Engineer Agustin Aragon y Leon. This honor to one of Mexico's leading scientists, born seventy-three years ago in the state of Morelos of which Cuernavaca is the capital, is considered but part of a movement toward greater appreciation of science in this important region of Mexico. Governor Jesus Castillo Lopez has already announced his support of a Mexican Council of Learned Societies and he has invited the Mexican mathematicians to hold their second convention in Cuernavaca next May. Engineer Aragon, for whom the street was named, was a member of the geodetic commission that set the border between the United States and Mexico. His career has been devoted to science, mathematics and philosophy as well as engineering.

MUSCLE tissue of a warm-blooded animal has been studied and photographed under the electron microscope, to disclose details of structure hitherto unknown, or at best inferred from indirect studies with x-rays and other means. This work, done at the Swedish Royal Academy of Sciences in Stockholm, is reported in a recent issue of the British journal, *Nature*, just received here, by Professor Fritiof Sjöstrand. Late in 1942, a group of investigators in Philadelphia reported electron microscope studies on muscle fiber, but this was the muscle of a cockroach. It is believed that the present Swedish research is the first carried out on a warm-blooded vertebrate. A guinea-pig supplied the muscle sample. Since the streams of electrons that are used instead of light rays in the electron microscope must pass right through the specimen, the muscle had to be sliced exceedingly thin. By a technique combining freezing and drying, Professor Sjöstrand was able to prepare sections that in places were only 20 millimicrons thick. A millimicron is a millionth of a millimeter or a twenty-five-millionth of an inch, so the areas shown in the photographs were slightly less than a millionth of an inch in thickness.

Pre-medical texts

Blakiston Books

BREMER

Textbook of Histology—5th Edition

This famous text is noteworthy for its clearness and readability, also for the quality and abundance of its illustrations. Emphasis is given to normal functional changes in the cells and to their activities in the living state. By J. L. Bremer, Harvard Medical School. 455 Illus. 580 Pages. $6.50

LAMBERT

Introduction and Guide to the Study of Histology

The objective is to impart a knowledge of the subject as a foundation for the further study of physiology and pathology. Comprehensive directions for laboratory study are included. By A. E. Lambert, School of Medicine, State University of Iowa. 185 Illus. 542 Pages. $5.00

NEAL and RAND

Comparative Anatomy

In this book the facts are given interest and meaning in terms of human phylogenesis. Descriptions are clear, and many well labeled figures are included. By H. V. Neal, Tufts College and H. W. Rand, Harvard University. 540 Illus. 739 Pages. $4.75

Chordate Anatomy

This text offers material for a sound morphological course with functional interpretations. 378 Illus. 467 Pages. $3.50

COLIN

Elements of Genetics

A modern, well integrated beginner's text in genetics. It includes at the end of each chapter a list of carefully graded problems. By E. C. Colin, Chicago Teachers College. 47 Illus. 386 Pages. $3.00

STILES

Handbook of Microscopic Characteristics of Tissues and Organs—2nd Edition

It gives in outline form the main histological characteristics of vertebrate tissues and organs. It is an excellent guide to laboratory study. By K. A. Stiles, Coe College. Illustrated. 204 Pages. $1.50

MARSHALL

Laboratory Guide in Elementary Bacteriology

This manual presents 92 experiments grouped under Introductory Technique, Physiology of Bacteria, Applied Bacteriology, Serology and Infection. By M. S. Marshall, University of California. 244 Pages. $1.75

PATTEN

Early Embryology of the Chick—3rd Edition

A clear, brief presentation of basic facts for beginning students in embryology. By B. M. Patten, University of Michigan. 87 Illus. 228 Pages. $2.50

Embryology of the Pig—2nd Edition

The fundamental facts of mammalian embryology are clearly presented in this book. 168 Illus. 327 Pages. $3.50

The Blakiston Company, Philadelphia 5

SCIENCE NEWS

Science Service, Washington, D. C.

RED STARS

A LARGE number of red stars, of the peculiar M type are imbedded in atmospheres of titanium oxide gas, is reported by Dr. Oliver J. Lee, director of Dearborn Observatory of Northwestern University, who has studied the problem during the past twelve years with the assistance of Ralph B. Baldwin, David W. Hamlin, and Richard F. Kinnaird. Approximately 85 per cent. of these red stars listed in Volume V of the "Annals of Dearborn Observatory" are relatively faint and have not previously been analyzed.

The M type stars are peculiar in that they are more numerous proportionally in the direction of the constellations Scorpio and Sagittarius, the center of our galactic system. This is in marked contrast to stars of the R and N type which are surrounded by an envelope of gaseous carbon, for they cluster notably in the opposite part of the sky in the direction of the constellation Orion.

Dr. Lee points out that "in view of the oft-repeated statement that a large proportion of advanced M stars are variable, it was reasonable to expect that a considerable number of new long-period variables would be found. We did not find half a dozen, although it would have been easy to detect a change of one or two magnitudes in brightness."

The study which Dr. Lee and his assistants have been making is hoped to throw light on the problem of how stars are born and what becomes of them when their internal energies have exhausted themselves. Observations of faint red stars will continue at Dearborn Observatory, and it is hoped eventually to complete a spectrographic survey of the whole sky, classifying all faint red stars up to a magnitude of 11.5.

RADIO STATION OF THE NATIONAL BUREAU OF STANDARDS

A NEW, more powerful radio station has been opened by the National Bureau of Standards in Washington. No one will be able to tune in for entertaining programs, however, for its broadcasts are limited to ticks, hums and whistles which set the frequency standards for technical men in many industries.

The service has now been extended so that good reception is possible throughout the United States, the North Atlantic Ocean and, with fair reception, over most of the world. Broadcasts will be continuous night and day on five, ten and fifteen thousand kilocycles.

The radio and audio frequencies serve as standards used by radio engineers of the armed forces, commercial stations and radio industry. It is by the National Bureau of Standards broadcasts that a station periodically checks to make sure that broadcasts are on the frequency prescribed by law and that the programs will come in where the listener expects them to be.

One of the audio frequencies used, 440 cycles per second, is the standard musical pitch corresponding to A above middle C. It is used by all musical instrument manufacturers, and many piano technicians and musicians. The broadcasts are helping to set up a uniform standard; for there has been some difference of opinion as to what the tone A really is.

Besides these frequencies there is a pulse every second heard as a faint tick when listening to the broadcast. These may be used as accurate time signals and their one-second spacing permits scientists to make accurate physical measurements.

Error of less than one part in 10,000,000 is the average accuracy standard maintained for all frequency broadcasts.

PROSPECTING FOR RADIUM ORE

PROSPECTING for radium ore with an "electrical detective" has proved practicable and the instrument may be adapted for sorting and grading radioactive material after it is mined. A portable adaptation of the Geiger-Muller counter, an instrument ordinarily used in the laboratory to detect and count ionizing particles, has been designed for prospecting by Dr. G. L. Locher of the Bartol Research Foundation, Swarthmore, Pa.

It was turned over to G. Carman Ridland, formerly resident geologist for Bear Exploration and Radium, Ltd., in Canada, who gives the results of his work in a report to the American Institute of Mining and Metallurgical Engineers, as follows.

"The results obtained with the Geiger-Muller counter at Great Bear Lake demonstrate that the instrument can be of value in the search for radioactive ore." He believes that the counter is "not only adaptable to the detailed search for radioactive ore bodies in established radioactive territories, but could, and should, be used by prospectors and members of federal geological survey parties in their aerial reconnaisances of large, unexplored regions."

Mr. Ridland surveyed areas at Contact Lake in Canada where pitchblende veins, source of radium and uranium, had been encountered during silver mining. By detecting abnormally high numbers of gamma rays shooting from the rocks, Mr. Ridland found several areas which warranted definite exploration programs.

Each ray entering the counter is translated by the instrument into a click which the operator hears in earphones. Since the instrument is also sensitive to the cosmic rays reaching the earth from outer space, a correction must be made for the background of clicks heard due to the cosmic rays.

THE PRODUCTION OF SYNTHETIC RUBBER

IMPROVED synthetic rubber production through use of an electronic "chemist" to analyze the complicated gases formed in making butadiene has been announced by Dr. John A. Hipple, physicist at the Westinghouse Research Laboratories, who in cooperation with technical men from the industries involved, adapted the instrument, called a mass spectrometer, for its new war job.

"In 15 minutes," Dr. Hipple explained, "this spectrometer will dissect a complicated gas molecule a twenty-five-millionth of an inch long and can be arranged to automatically produce an autograph that tells the chemist the composition of the gas. At present certain analyses require from 15 hours to three days of painstaking laboratory work by five to ten skilled chemists—others can not be done at all even by other processes. Results attained by these tedious methods are much less accurate than the molecular 'portrait' that comes out of the spectrometer."

As butadiene molecules are built up in the chemical plant, their composition must be checked at intervals to make sure the correct structure is being obtained. An error in molecular design would result in poor quality synthetic rubber.

Present methods are sometimes so slow that the batch of butadiene has gone through the various steps of processing before the check analysis is completed. Thus, under the old method, a batch of butadiene may have to be reprocessed, causing lost production time.

TROPICAL PLANTS

IF you should get lost in the jungle, after a forced plane landing or a shipwreck, and have to live off the country while you find your way out, hunt for plants that look like the ones you knew back home. This is one hint offered for the benefit of "bushed" soldiers and sailors by Dr. E. D. Merrill, of Harvard University, administrator of its extensive plant collections, who spoke on August 14 over the Columbia Broadcasting System in Science Service's Adventures in Science program. Dr. Merrill is the author of the first government-sponsored manual on emergency foods, entitled "Emergency Food Plants and Poisonous Plants of the Islands of the Pacific."

"In the tropics, as elsewhere," stated Dr. Merrill, "one may eat all types of animals and birds that can be captured, including lizards, snakes, rodents, monkeys, bats, parrots and even locusts." Dr. Merrill spoke from experience, for he has tried them all on occasion.

Certain natural groups of plants growing both in the United States and the tropics have definite family characteristics. In the rose family, there are practically no poisonous plants. In the large bean family, on the contrary, some species make excellent food while the seeds of others are very poisonous. The emergency food manual is designed to give men with no knowledge of botany the information needed to make a proper selection. The tender central bud of most species of palms, the so-called palm cabbage, may be eaten either raw or cooked. Other palms, such as the sago, sugar palm, talipot, and fishtail palm, store up immense quantities of starch in their trunks, which can be extracted and used for food. Many members of the calla-lily family have fleshy roots which may be eaten provided you know how to eliminate the microscopic stinging crystals that make these plants intensely irritating when eaten raw. In general, the tender, uncurling leaves of ferns may be safely eaten. Young bamboo shoots also are excellent.

Dr. Merrill first became interested in economic botany when a small party of which he was a member was left on a remote island and the entire party existed on the unexciting diet of boiled rice three times a day for a week. Since then, experimenting with native foods has been his hobby.

ITEMS

THE U. S. Public Health Service has received funds from the W. K. Kellogg Foundation for sixteen additional fellowships in health education. Each fellowship carries a monthly stipend of $100 for twelve months plus tuition and leads to a Master's Degree in Public Health. Studies may be pursued at Michigan and Yale in addition to the University of North Carolina, where 20 fellows are already training. The object of these fellowships is to train health educators to meet the present shortage of such personnel and an anticipated demand in the future in both this country and abroad. Placement after training is anticipated. The new fellows will start their training with the fall term at the respective universities. Applications and other pertinent material must be in the office of the Surgeon General, U. S. Public Health Service, Washington, D. C., on or before September 4.

DISCOVERY, apparently for the first time on record, of a dog with two brains was made at the laboratories of the Health Department of the District of Columbia. Dr. John E. Noble, director, thought someone was playing a joke on him when first told of the discovery. The two brains in one head were discovered in a collie of mixed type, but no unusual appearance, by J. B. Holland. Mr. Holland was examining the dog's brain for rabies when he found the second, smaller brain behind the first, but also attached to the dog's spinal cord. Evidence of rabies was found in both brains. Authorities at the Bureau of Animal Industry, stated that they had never heard of such an anomaly before. Two-headed calves, five-legged animals and humans with an extra thumb or finger, yes; but a two-brained dog is apparently something new in the records. Dr. Noble suggests that there may be more such which never are discovered because, luckily, they fail to get rabies and have their brains examined after death. By the time the discovery of the second brain was made and verified, both had been handled too much to make it possible to preserve them as museum specimens.

FRUIT jars for home and factory canning may be covered and sealed by what seemingly is a device never before used. It is called a "side seal glass closure" and was developed by the Hartford-Empire Company, a manufacturer of glass machinery located in Hartford, Conn. The company is offering the design of this new glass closure freely to the industry as a contribution to the war effort. A pliable plastic material is used as a gasket to fit around and slightly above the top of the jar. When rubber becomes plentiful again, either natural or synthetic rubber gaskets may be used instead of the plastic. The rim of the glass cover is slightly bevelled on the inside. When the cover is placed over the jar and gasket and firmly pressed, it compresses the gasket and causes the projecting upper edge of it to mold itself over the top edges of the jar. Glass does not touch glass at any spot. The seal is perfect. The top is easily pried off when the jar is to be opened.

McGraw-Hill Books in Meteorology

An Introduction to Weather and Climate.
New second edition

By GLENN T. TREWARTHA, University of Wisconsin. *McGraw-Hill Series in Geography.* 541 pages, $4.00

A revision and expansion of the author's well-known text, written from a climatic point of view and designed to provide an outline for a general course on the atmosphere. The material dealing with the elements of weather and climate has been largely rewritten; much new material on air masses has been added; and many other changes and additions have been made to bring the text abreast of the latest development.

Air Navigation. Introduction to Earth

Flight Preparation Training Series. Published under the Supervision of the Training Division, Bureau of Aeronautics, U. S. Navy. 79 pages, $1.00

Designed to orient the naval aviation cadet to navigation that may encircle the earth. The book gives an over-all view of the earth as a sphere, of place relationships of war zones, of general climatic considerations underlying strategy, etc. The many excellent maps are a feature of the book.

Aerology for Pilots

Flight Preparation Training Series. Published under the Supervision of the Training Division, Bureau of Aeronautics, U. S. Navy. 107 pages, $1.25

What the pilot must know about aerology. Emphasis is placed upon understanding of weather reports (forecasts, weather maps, and sequence reports) and the personal weather observations necessary to find favorable flying conditions and avoid or conquer weather hazards.

Workbook in Meteorology

By A. F. SPILHAUS, Captain, U. S. Army, on leave from New York University, and JAMES E. MILLER, New York University. 163 pages, $2.50

A collection of project type exercises for use with any textbook on elementary meteorology. The exercises correspond to the chief divisions of meteorology: climatology, instruments and observations, physical and mathematical considerations, and weather analysis.

Introduction to Meteorology

By SVERRE PETTERSSEN, formerly of Massachusetts Institute of Technology. 236 pages, $2.50

A concise, nontechnical discussion of the basic principles of meteorology. The treatment is intended for the student without previous knowledge of the subject, and makes clear the various weather phenomena, atmospheric conditions, and other aspects of meteorological science applicable to forecasting.

Weather Analysis and Forecasting

By SVERRE PETTERSSEN. 505 pages, $5.00

Gives a complete, factual treatment of the principles of diagnosing the physical, dynamic, and kinematic atmosphere and comprehensively discusses the methods of their application to actual forecasting. Investigations in the fields of air-mass analysis, frontal analysis, and isentropic analysis are included.

Dynamic Meteorology

By BERNHARD HAURWITZ, Massachusetts Institute of Technology. 365 pages, $4.00

An introduction to dynamic meteorology, giving a lucid treatment of the laws of thermodynamics and dynamics that operate in the atmosphere—a fairly elementary discussion of the fundamental principles and theories underlying the modern methods of airmass analysis, isentropic analysis, and frontal analysis.

Elementary Meteorology

By VERNOR C. FINCH and GLENN T. TREWARTHA, University of Wisconsin. M. H. SHEARER, Westport High School, Kansas City, Mo., and F. L. CAUDLE, Oshkosh, Wisc., State Teachers College. 290 pages, $1.76

Written for very elementary preflight courses, this text shows the student how atmosphere, weather, climate, and natural phenomena influence flying and how accurate knowledge of weather conditions determine the success of every long flight.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C.2**

Announcing

THE TECHNICAL SECRETARY SERIES

By QUEENA HAZELTON
Formerly of Texas Christian University

Each of these manuals, which are especially suitable for war training courses, is organized as follows: (1) Technical previews in Gregg shorthand outlines; (2) appropriate solid-matter dictation, based on the previews; and (3) a complete glossary of terms. All terms are defined fully and, where advisable, are spelled phonetically.

THE MILITARY STENOGRAPHER. 133 pages, 5⅜ x 8. $1.00

This is a manual of general military terms. It is intended for coaching the qualified secretary in the general terms of the Army. Thus the book is devoted exclusively to nomenclature and makes no attempt to teach the fundamentals of stenography. The author covers such topics as titles of officers, salutations and signatures, forms for letters, enclosures of sequence, general military terms, court-martial terminology, etc.

THE NAVAL STENOGRAPHER. 121 pages, 5⅜ x 8. $1.00

In this brief manual the author presents dictation assignments designed to train secretaries in the use of general naval terms and of terms used in marine engineering.

THE MEDICAL AND SURGICAL SECRETARY. 319 pages, 5⅜ x 8. $2.00

Here the author seeks to familiarize the secretary with the terminology used in medicine and surgery. Lessons are included on Greek and Latin prefixes and suffixes, branches of practice, specialities of surgery, medico-military terms, human anatomy, parts of bones, fractures, neural terminology, the vascular system, regions, reflexes, the larger muscles, psychiatric terms, clinical chemistry, bacteria, pathology, case reports, surgery, etc.

THE AVIATION SECRETARY. 233 pages, 5⅜ x 8. $1.50

The terminology presented in this text is intended for other workers in the field of aviation, as well as for stenographers. Topics covered include aircraft types, air carrier operators, air mass names, air navigation, wind directions, navigation instruments, meteorology, aerodynamics, aircraft maintenance and operation, powerplant, engines, air traffic control, and radio and communications.

SECRETARY TO THE ENGINEER. 309 pages, 5⅜ x 8. $1.75

The purpose of this text is to give the secretary sufficient basic training in the nomenclature of engineering, and to increase her general knowledge. The lessons deal with structural engineering, mechanical specifications, heating and ventilating, plumbing, electric wiring, mechanical engineering, civil engineering, electrical engineering, chemical and metallurgical engineering, chemical weights and measures, etc.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

SCIENCE NEWS

Science Service, Washington, D. C.

LAVOISIER

ANTOINE LAURENT LAVOISIER, the great eighteenth century French scientist who met his death by the guillotine at fifty-one years of age, was born in Paris on August 26, 1743, just 200 years ago. His untimely death left unfinished much important scientific work, a calamity unappreciated in those days. His condemnation to death was due more to his economic, social and political reform activities than to his strictly scientific work.

Lavoisier was only twenty-three years of age when he received his first public recognition as a scientist. At that age he was awarded a gold medal by the French Academy of Sciences for an essay on the best means of lighting a large town. At twenty-five years he became a member of the academy staff as an associate in chemistry. While interested in all sciences, his greatest interests in those days seems to have been in chemistry and the agricultural sciences. Many regard his work in this latter field as his greatest contribution to the world.

Lavoisier may be called the originator of the model farm idea and perhaps of the agricultural experiment station. In 1778 he started a model farm on which he demonstrated the advantages of scientific cultivation of the soil and of maintaining good breeds of cattle and sheep. Thomas Jefferson was familiar with this and undoubtedly secured many ideas from Lavoisier. It will be remembered that the French Academy of Sciences gave Jefferson an award for the plow he invented.

Seven years after establishing the model farm Lavoisier was made secretary of the Committee on Agriculture of the French Government. As such he drew up plans for the establishment and operation of agricultural experiment stations. This was a hundred years before the American government recognized the need of such stations and provided federal financial aid to the few state stations already established, and to help to establish stations in all other states. Lavoisier also advocated the distribution of agricultural implements and the adjustment of the rights of pasturage.

Gunpowder was another special interest of Lavoisier. In 1775 he was given a governmental appointment which gave him considerable administrative power over its manufacture. He abolished a vexatious procedure then practiced of searching private homes for saltpeter needed in powder making. He found ways of increasing the production of this salt and also vastly improved methods of making more and better powder.

The breadth of Lavoisier's interest in the sciences is indicated by some of his early papers. He wrote on the analysis of gypsum, on the aurora, on the conversion of fluids to solids, and a refutation of the then popular belief that water by repeated distillations could be converted into earth.

Later in his life he discovered that water is composed of oxygen and hydrogen, and so announced to the academy in 1783. He did important early work in thermochemistry. His name is associated with the overthrow of the generally accepted phylogistic doctrine, which held that some kind of a hypothetical substance existed in all combustible materials and was given off in combustion.

Lavoisier's governmental activities in financial, social and economic affairs, together with some of his advanced ideas in the fields of science, caused his condemnation by the leaders of the French Revolution. None of these acts was to his discredit. By subjecting him to execution France lost a valuable servant, an able honest statesman and a great scientist.

FOOD DEHYDRATION

BETTER food dehydration through use of radio-frequency energy to drive out the moisture has been developed. The process makes possible for the first time removal of 99 per cent. of the moisture content from a compressed vegetable block, according to a report by Vernon W. Sherman, of the Federal Telephone and Radio Corporation, who developed the method in cooperation with the Office of the Quartermaster General of the Army.

Evidence indicates that vegetables dehydrated by the electronic method will not deteriorate over a period of one to two years even in hot, humid climates. As a first step, 80 per cent. of the water content of vegetables is removed by conventional dehydration. The vegetables are then compressed into blocks from which the remaining moisture is reduced to one per cent. by radio-frequency energy in a partial vacuum. Since other methods of drying require the exposure of as much of the vegetable surface as possible, this process of compressing the vegetables into tight blocks, prior to drying them further, is unprecedented. It is done to concentrate a large amount of food in a small magnetic field for reasons of economy.

About five per cent. moisture is generally left in the food by ordinary dehydration using hot air, which involves danger of spoilage, especially in the tropics. Attempts to reduce this moisture content by warm air often give the dried vegetables a tough, blackened skin, called "case hardening," but this does not occur when radio-frequency energy of the proper wavelength is used. Drying is accomplished in about an hour. The short-wave energy is actually turned on only a part of this time. Due to the speed of the process, apparently, the vitamin content of the dried foods is reported to be unusually high.

The temperature throughout the foods being dried is said to be remarkably uniform, unlike the difference between the outside and inside of food under dehydration by other methods. Electronic drying is well adapted to automatic straight line production, and from laboratory results it is calculated that one pound of water may be removed electronically as described with less than one kilowatt hour of energy, costing about one cent, which compares favorably with the cost of other methods.

To test the new food dehydration method on a com-

Anatomy

● MORRIS'

Human Anatomy, 10th Edition

This famous text thoroughly revised and brought in line with current thought, presents a complete study of the human body written by eminent anatomists. Throughout the text reference is made to clinical aspects and relations of parts and systems under discussion. Most of the illustrations have been remade and improved by a new technique. Written by 13 Contributors, Edited by J. Parsons Schaeffer, Jefferson Medical College, Philadelphia. **1155 Illus., Mostly in Colors, 1641 Pages. $12.00** (1942)

● KRIEG

Functional Neuroanatomy

Presenting the study from a new approach, this book includes in one account, the anatomy, connections and physiology of the human central nervous system. The entire text is arranged in functional lines. A notable feature of the work is the large double-page illustrations completely interpreted by three-dimensional reconstructions. By W. J. S. Krieg, N. Y. University School of Medicine. **274 Illus., 553 Pages. $6.50** (1942)

● SHEARER

Manual of Human Dissection

With clear, brief instructions, this manual guides the student to the structures he can reasonably be expected to study in the limited time given to dissection. The illustrations have genuine teaching value. By E. M. Shearer, N. Y. University School of Medicine. **79 Illus., 321 Pages. $4.25** (1937)

● STILES

Handbook of Microscopic Characteristics of Tissues and Organs, 2nd Edition

This book offers help to the student in identification studies. The material is arranged in systems and each system is followed by a tabular summary. Discussions are subdivided into general characteristics, unique attributes, types, origin from fundamental layers of the embryo and examples of locations in the body. By K. A. Stiles, Coe College. **204 Pages. $1.50** (1943)

● CUMMINS and MIDLO

Finger Prints, Palms and Soles: An Introduction to Dermatoglyphics

This new text offers an exhaustive, well-illustrated study of dermatoglyphics written by eminent university teachers of anatomy. Besides its use in personal identification, in studying differential trends among races, between the sexes and among constitutional types, the book presents valuable material for those of a biological turn, especially anatomists, physical anthropologists, geneticists, zoologists and physicians. By Harold Cummins, and Charles Midlo, Tulane University School of Medicine. **149 Illus., About 350 Pages.** *Ready This Fall*

THE BLAKISTON COMPANY, Philadelphia 5

mercial scale, plans are being considered for construction of a 50 kilowatt electronic food-drier, which would handle six tons a day of dried food, equivalent to perhaps sixty tons of fresh food.

IMMUNIZATION

A REPRESENTATIVE study of cities of 100,000 population or over shows that a majority of children are now immunized at some time against diphtheria and smallpox, but scarlet and typhoid fever vaccinations, in comparison, are still negligible.

In a survey reported by Selwyn D. Collins, head statistician, and Clara Councell, associate statistician, of the U. S. Public Health Service, a canvass of 213,931 households was made in 28 cities to learn the extent of immunization.

By the time children are eight years old 61 per cent. have been immunized against diphtheria as compared with 85 per cent. protected against smallpox. For the older children the percentage immunized against diphtheria declines, but for smallpox it increases until the score sheet for 14-years-olds shows 90 per cent.

For diphtheria immunization of two- and three-year-olds, which is especially important, the intermediate cities carried off top honors with 34 per cent. and 43 per cent. while the Western cities averaged only 14 per cent. and 19 per cent. for the two age groups. In these early preschool ages the South, which was lowest in most school ages, was higher than the Northeast and almost as high as the North Central—the highest sections for practically all school ages.

For smallpox the Northeast, intermediate cities, and the South all show above 90 per cent. vaccinations by the time children are eight years of age. The North Central and particularly the West are low. In the number of smallpox cases reported in the survey, the West is above any other section.

Evidence indicates that the level of diphtheria immunization has increased considerably since the survey was made, but the level of smallpox vaccination has probably little changed.

"The percentages of children who had been immunized against scarlet fever were too small in every region," the report states, "to have much effect upon the prevalence of the disease."

Immunizations did not get above five per cent. for any age, although the North Central area and intermediate cities show the best record.

Typhoid vaccinations are even fewer; peak groups hardly top two per cent. in any of the Northeast, North Central or intermediate cities. The maximum in the West was five per cent., while the South showed the best record for typhoid with a 13 per cent. maximum. But the 13 per cent. appears to reflect the size of the typhoid problem rather than the effectiveness of controlling the disease. Percentages of those interviewed in the South who had a case history of typhoid stand well above all other areas and the mortality rates in the South were three times those in northern sections.

ITEMS

PRACTICAL and immediate exploration of new chemical projects to fight the menace of post-war unemployment of millions of workers is advocated by a publication of the American Chemical Society. Release from war production of limited amounts of critical materials and sufficient numbers of trained workers is urged. Chemical projects need from five to ten years from the inception of an idea until a commercial-size plant can be operated it is explained. Planning in industry is normally a continuous process, but long-term planning has been slowed down during the past year or two because war production has taken all efforts. The American Chemical Society statement points out that all chemical companies have half-developed projects that are now at a point where semi-large-scale or pilot-plant operation is necessary for further progress, but that shortages of critical materials stopped this work months ago. Pilot plants can be built by chemical plants under WPB plan P–43 recently issued and this is considered by the chemists to be the first step toward getting their industries ready for a vigorous post-war development.

SCIENCE books for the blind are being developed by the Westinghouse Electric and Manufacturing Company through cooperation of its research staff and school service department. An experimental Braille edition of the first booklet has been printed and distributed to 85 schools for the blind throughout the United States. Children at the Western Pennsylvania School for the Blind, who acted as judges, were enthusiastic because it put science on the level of their every-day experience. Braille editions of other booklets are now being considered for distribution. The project developed from the Little Science Series, a group of booklets on subjects ranging from microscopic life to the planets of our solar system, which have been already distributed in the ink-print edition to about 600,000 junior and senior high school students.

NEW knowledge of the forces that hold together the heart of an atom may result from studies now being conducted at a mountain-top laboratory in Colorado by a group of physicists from the University of Chicago, led by Dr. Marcel Schein. At the high altitude of the cosmic ray station on Mt. Evans a study will be made of the production of mesotrons, the electrical particles in cosmic radiation coming from the upper atmosphere which are probably 150 times as heavy as an electron. Besides the problems of mesotron formation and distribution, studies of giant cosmic ray showers will be continued. As primary cosmic rays come to earth from outer space they assume changing forms due to the increasing density of the atmosphere nearer the earth. Investigators therefore go to high altitudes where they can study a little closer to their source cosmic ray showers and the mesotrons which produce them.

Physics

New and Standard Texts

HECTOR, LEIN and SCOUTEN

289 Illus.
355 Pages
Probable Price
$4.00

Electronic Physics

This is a beginner's text with a new approach to the subject. It is a clear, well integrated study of the principles of electronic physics written by active teachers thoroughly acquainted with the problems to be solved. By L. Grant Hector, Herbert S. Lein and Clifford E. Scouten.

FOLEY

470 Illus.
757 Pages
$3.75

College Physics, 3rd Edition

Widely adopted for use by students in the arts and sciences, this text is also giving excellent results in the accelerated program. It stimulates the scientific method of reasoning. By A. L. Foley, Indiana University.

DUFF (And Contributors)

630 Illus.
715 Pages
$4.00

Physics, 8th Edition

A standard text for students of science and engineering. Written by collaboration of eminent physics teachers. Edited by A. Wilmer Duff, Worcester Polytechnic Institute.

STRANATHAN

218 Illus.
571 Pages
$4.00

The "Particles" of Modern Physics

A study of the fundamental particles of physics designed for a college course at the junior or senior level. Experimental evidence for each concept is stressed. By J. D. Stranathan, University of Kansas.

MORRISON and MORRISON

189 Illus.
235 Pages
Detachable
Worksheets
$2.00

Experimental Physics

A comprehensive manual in experimental physics for college students. By E. Morrison and S. E. Morrison, Michigan State College.

DUFF and PLIMPTON

86 Illus.
173 Pages
$2.75

Elements of Electro-Magnetic Theory

A very teachable text for a brief intermediate course. By A. Wilmer Duff and S. J. Plimpton, Worcester Polytechnic Institute.

MASSA

107 Charts
228 Pages
$4.00

Acoustic Design Charts

A comprehensive source of quantitative design information for those interested in the theory, design or construction of electro-acoustic apparatus. By Frank Massa, Brush Development Co., Cleveland.

SCIENCE NEWS

Science Service, Washington, D. C.

THE CONSTELLATION OF CEPHEUS

A STAR in the constellation of Cepheus has been found to be the bright member of a double star team with a period of about fifty years. The eccentricity of the orbit of this binary, Beta Cephei, is equal to 0.66, according to the report of Dr. Burke Smith, of the Yerkes Observatory, in the *Astrophysical Journal* for July.

The average period during which the star alternately seems to approach and recede from the sun is slowly lengthening. During the past twenty-five years this increase has amounted to 0.43 seconds. This is at a rate of 1.7 seconds a century, which is a decided change when one considers the life of an average star. The data available are so limited, however, that Dr. Smith finds it impossible to decide if this increase is occurring spasmodically or at a constant rate.

This star is typical of a small group of B-type stars with variable radial velocity. Their periods are less than half a day and the velocity ranges so small that they can scarcely be explained in terms of binary motion.

An abrupt change in the length of the period of Beta Cephei occurred when the orbits of the two components brought them closest together in 1914–16. After periastron the period began to lengthen and is now found to be 0.1904886 day. There seems to be no conclusive evidence of a change in ionization or excitation with the change in phase. The ionized helium lines are visible on a few plates, but no definite correlation of the visibility of these lines with phase was found.

During the period considered the star has gone through some seventy thousand complete cycles. Dr. Smith's study was based on measurements of Yerkes plates taken in 1940–42, and a review of all published radial-velocity measurements of the year since 1906.

REPORT ON THE OTERMA COMET

THE comet reported earlier this year by Miss L. Oterma, astronomer of Turku Observatory, Finland, may actually be an asteroid, according to a report received at the Harvard College Observatory.

A preliminary investigation of the elements of the comet, made by George H. Herbig and Miss Delia McMullin, of the department of astronomy at the University of California at Los Angeles, showed that the eccentricity appears to group this object with the asteroids rather than the comets.

The stellar object in this case may be one of the multitude of minor planets revolving between the orbits of Mars and Jupiter and shining entirely by reflected light, instead of belonging to the highly eccentric comets which shine partly by reflected light and partly by light of their own.

"Attention should be called to the resemblance between Comet 1943a and Minor Planet 334 (Chicago)," is pointed out by Dr. Herrick. "If the two objects are identical," he adds, "the eccentricity of the minor planet has again passed through 0, as it did before the conjunction of 1894."

The Oterma Comet was first seen on April 8 in the constellation of Virgo. It is not bright enough to be seen without the aid of a telescope, the magnitude remaining about 16.3. Miss Oterma is credited with discovering two comets last year.

These elements are essentially the same as those obtained first by L. E. Cunningham, and R. N. Thomas, and reported to the Harvard College Observatory.

IMPROVED INSULIN TREATMENT FOR DIABETES

A MIXTURE of two forms of insulin which simplifies treatment of diabetics and gives better control of blood sugar is announced in the *Journal* of the American Medical Association. Slow-acting protamine zinc insulin, already in use for several years, is mixed with the original type of rapid-acting insulin to make a single daily injection having many of the advantages of both types.

Protamine zinc insulin has been used to reduce the number of injections necessary for most diabetics compared to the use of ordinary insulin. But since the insulin is slowly released from the protamine zinc compound at a steady rate throughout the day and night, moderate and severe cases of diabetes have not always received adequate control of the blood sugar level after meals when the need for insulin is greatest. To combat this condition, physicians have been prescribing an additional second injection of regular insulin along with the protamine zinc form usually to be taken just before breakfast. Thus the prolonged action of protamine zinc insulin protects against too much blood sugar at night, while the regular insulin tends to control the rise of blood sugar after meals.

Objections to this solution of the problem are that it is a compromise method requiring two injections a day, thereby partly nullifying one of the chief advantages of protamine zinc insulin, and it requires the patient to use two different forms of insulin with two different doses, thus increasing the possibility of error.

Following the lead of earlier workers, two groups of physicians report successful clinical trials using a mixture of the two insulins in a single injection. Drs. Cyril M. MacBryde and Harold K. Roberts, of St. Louis, conducted a comparative clinical study on sixty-two patients using a mixture of three parts of fast-acting insulin to one part with slow effect.

It was discovered, however, that acidity or alkalinity affected the amounts of the two kinds of insulin found in the final mixture. To avoid this uncertainty, the insulins were mixed and adjusted to a slight alkalinity about the same as that found in body tissues, which produced a final product of the proper composition.

Use of the new insulin mixture on severe diabetes not only controlled blood sugar as well as when both insulins were given separately, the physicians report, but gave better regulation in most cases. Less expected were results on mild cases which showed that the 3:1 insulin gave better effects than the usual treatment of these cases in which protamine zinc insulin alone is administered.

Three New Books of Timely Interest

MATHEMATICS ESSENTIAL TO ELECTRICITY AND RADIO

By NELSON M. COOKE, Lieut., U. S. Navy; Executive Officer, Radio Materiel School, Naval Research Laboratory, Washington, D. C.; and JOSEPH B. ORLEANS, Head of the Mathematics Department, George Washington High School, New York, N. Y. 382 pages, 6 x 9, 248 illustrations. $2.40

This book presents the essentials of secondary school mathematics required for electricity and radio, and gives the student a quick working knowledge of theory and applications. New topics are fully explained as they are approached, and are illustrated by examples. Electrical and radio terms are completely defined. Sample solutions are provided for each new group of exercises or problems. An especially understandable explanation is offered of Ohm's law and Kirchhoff's laws.

MATHEMATICS FOR ELECTRICIANS AND RADIOMEN

By NELSON M. COOKE. 616 pages, 6 x 9, 298 illustrations. $4.00

This pioneering text has established a distribution record unequalled by any book on mathematics in the history of the McGraw-Hill Book Company. Developed at the U. S. Navy Radio Materiel School at the Naval Research Laboratory, Washington, D. C., the text grew out of the author's many years of experience in teaching mathematics to Navy Electricians and radio operators. Here is a text so thorough, so complete, so careful and painstaking in its explanations, that instructors everywhere find that it gives their students a sound mathematical foundation and shows them how to apply this knowledge to the solution of practical radio and circuit problems.

RADIO ENGINEERS' HANDBOOK

By FREDERICK EMMONS TERMAN, Professor of Electrical Engineering and Executive Head, Electrical Engineering Department, Stanford University (absent on leave); Director, Radio Research Laboratory, Harvard University; Past President, the Institute of Radio Engineers. 1019 pages, 6 x 9, 869 illustrations. $6.00

One of the most complete works of its kind ever published, this outstanding reference book and handbook presents a wealth of sound, technical information especially selected and organized to meet the needs of the engineer dealing with practical radio and electronic problems. Up to date and authoritative in all respects, the handbook deals with electronics and vacuum tubes, wave guides, cavity resonators, klystron and other microwave tubes, radio aids to navigation, oscillators, wide-band antennas, and hundreds of other topics of interest to the radio engineer.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C.2**

Another study, using a different mixture of the insulins containing two parts of regular and one part of protamine zinc, is reported by Drs. Arthur R. Colwell and Joseph L. Izzo, of Evanston, Ill. Their studies on sixty patients show that a single injection of this mixture also gives better control than that obtained with standard insulins injected more often.

The insulin is released at a rate which causes moderate increases in intensity when needed after meals and allows decreases when desirable during sleep. Dosage is about 10 per cent. less than with ordinary methods because of improved efficiency.

CACAO AND OTHER FOOD CROPS GROWN IN EL ORO PROVINCE, ECUADOR

COCOA, chocolate and other cacao products for the United States may soon be obtainable in increasing quantities from Ecuador in equatorial South America. Other tropical and semi-tropical products which in pre-war days came from the Far East, may in post-war days come more largely from the Western Hemisphere, from its tropical regions on the Pacific coast. This project is being carried out under the leadership of the Office of the Coordinator of Inter-American Affairs in cooperation with the government of Ecuador. The area concerned, the province of El Oro on the south coast of Ecuador, was laid waste in 1941 in the century-old boundary dispute between Peru and that country. The actual rehabilitation work in the field started a year ago.

At the end of a year, El Oro now has a good cacao crop for export, as well as some tobacco and coffee, and a record-breaking crop of rice for feeding its own people. It is harvesting rubber from native trees, and gathering native fibers and making bags for packaging its export materials. Poultry and cattle are assisting in its home economies. America's investment in capital, technical assistance, and in good-will may be amply repaid.

El Oro province is about half the size of Connecticut. Its population is about 77,000. It has tropical lowlands near the coast and a high, cool mountainous area inland. It is capable of producing all its own needs in food and much for export. By way of the Panama Canal, it is about 3,000 miles from New York.

HEALTH DURING THE WAR

"AMERICA at war continues in good health," statisticians of the Metropolitan Life Insurance Company report in a summary of mortality experience of its millions of industrial policy holders in the 19 months since Pearl Harbor.

In 1942 the mortality was the lowest ever recorded for any year. Although the monthly death rates have been higher each month this year than for the preceding year, the rate for the first six months of 1943 is only 7 per cent. higher than for the same period in 1942 and appreciably lower than in any year before 1938. Aside from the mounting toll of war deaths the only other unfavorable features are the higher-than-ever-before death rates from cancer, cerebral hemorrhage and diseases of the heart and arteries.

Gasoline rationing has rolled back the auto accident death rate to 11.6 per 100,000 population which is about what it was for the first half of 1922, and 37 per cent. below the first half of 1942.

American women, now playing an important role in war production, are healthier than ever. In the two years before our entry into the first World War the death rate among the company's women industrial policy holders was 13 in every 1,000 of ages 15 to 74 years, while in the 1940–1941 period it was less than half that, seven per 1,000.

Married people, the statisticians find, live longer, this being especially true for married men. At ages 30 to 44 years the death rates among married men are just about half those among the bachelors. Between 1929–1931 and 1939–1941 the death rates declined somewhat more rapidly among the married than among the single at ages under 40 years. Those whose marriage is broken by death, however, experience a mortality even higher than those who remain single. Here again the men are slightly worse off than the women.

ITEMS

THE Polish Medical Center in Scotland is prepared to move its staff and equipment to Poland as soon as peace is declared. In this manner Poland may once again become the health frontier for post-war Europe. The double objective of the center is relief to suffering Poles who can be reached to-day and constant training for Poles in Scotland for the immense relief job to begin the day Poland is free. Scots, Poles and Americans are cooperating to make the Paderewski Polish Hospital and Polish Medical School of the University of Edinburgh possible. A number of graduates of the medical school are already interning in the hospital. The idea of the center was originated by Dr. Anthony Jurasz, formerly professor of surgery and dean of the medical faculty at the University of Poznan. Polish specialists in various branches of medicine and surgery have been attracted to the center. The 200-bed hospital has such specialized equipment as a pathological laboratory and X-ray tuberculosis research ambulance. The Paderewski Testimonial Fund, Inc., of which Mrs. Vernon Kellogg, of New York City and California, is chairman, is arousing interest in this center in the United States.

WHEN the Allies entered Sicily Germany lost all chances of getting any more Sicilian sulfur for her war industries, sumac tannin for leather making, and citrus products for her submarine and other naval crews, for soldiers, and for privileged civilians. When the Allies control Italy itself Germany will no longer be able to obtain foodstuffs from that country. She has been getting quantities of early potatoes, fresh vegetables, nuts, fruit and other agricultural products. Even in pre-war days German buyers bought much of Italy's surplus food products for export to Germany. They bought 55 per cent. of the fresh fruit exported from Italy, 42 per cent. of the almonds, 41 per cent. of the rice, 37 per cent. of the lemons, and 34 per cent. of the oranges. In addition they purchased large quantities of fresh vegetables, early potatoes, wines, olives, table oils and cheeses.

WILEY

WILEY BOOKS

for your V-12 and AST courses

INTRODUCTORY COLLEGE CHEMISTRY

By H. G. DEMING, *Professor of Chemistry, University of Nebraska.* Second Edition Completely Revised in Collaboration with B. CLIFFORD HENDRICKS, *Professor of Chemistry, University of Nebraska.*

A course for beginners. In this book the simplest of the important principles of chemistry are interwoven in an interesting way with the story of how chemistry grew and developed and a vivid description of the part that it plays in modern life and industry. The final chapter deals with the chemistry of food and nutrition. Simpler and more concise than either the "General Chemistry" or the "Fundamental Chemistry."

Second Edition: 521 pages; 6 by 9; $3.00

FUNDAMENTAL CHEMISTRY

By HORACE G. DEMING.

An elementary book for college classes. It reveals the spirit of modern chemistry and gives a brief survey of its achievements as a science. Its purpose is to show how a chemist thinks about chemical problems of everyday life. It is remarkable for the care that is taken in defining and explaining words, thus leading the student gradually to acquire an extensive and accurate technical vocabulary.

756 pages; 6 by 9; $3.50

GENERAL CHEMISTRY

By HORACE G. DEMING.

Substantiality and exactness together with its popular manner of presentation have made this textbook one of the few permanently outstanding general chemistries. It may be used equally well for beginners and by students with previous knowledge of chemistry, as arrangement of material permits somewhat different sequence of topics in the two cases. Briefer and simpler than the author's "Fundamental Chemistry," and gives more attention to the applications of chemistry in modern industry.

Fourth Edition: 769 pages; 5½ by 8½; $3.50

LABORATORY MANUAL OF COLLEGE CHEMISTRY: Elementary Course

By HORACE G. DEMING.

This manual is designed for use in the elementary course in college chemistry. Each of the forty-eight experiments consists of several parts, from among which a choice may be made according to the length of the laboratory period. At frequent intervals, from the very first, laboratory problems are included for which the student must devise his own experimental procedure, based on experience gained in the exercises just preceding.

268 pages; 8½ by 11; $1.75

EXERCISES IN GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS

By HORACE G. DEMING and SAUL B. ARENSON, *Professor of Inorganic Chemistry, University of Cincinnati.*

Offers a wide range of experiments, with accurate and clearly written directions and comments. The first part of the book presents exercises including inorganic preparations, verifications of the quantitative laws in chemistry, fundamental concepts such as oxidation and reduction, physico-chemical measurements, photography and the sensitivity of qualitative tests, etc. The latter part deals with systematic qualitative analysis of inorganic mixtures.

Fourth Edition: 326 pages; 5½ by 8½; $1.80

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

SCIENCE NEWS

Science Service, Washington, D. C.

GIANT MOLECULES AND DISEASE VIRUS PARTICLES

FRESH evidence that virus disease particles are giant protein molecules endowed with the life-like properties of reproduction and parasitic feeding has been obtained by Dr. Max A. Lauffer of the Rockfeller Institute for Medical Research at Princeton, N. J., and was exported by him at the Pittsburgh meeting of the American Chemical Society.

This new advance in science's war against disease was made through the use of a powerful weapon known as the ultracentrifuge, which whirls tubes of solutions at speeds far exceeding those of rifle bullets and cannon shells, separating substances or particles of different densities and sorting them in layers, as a cream separator separates cream from skim milk.

Identification of virus particles as giant molecules was made tentatively eight years ago by Dr. Wendell M. Stanley, also of the Rockefeller Institute, who first obtained a disease-bearing protein from sick tobacco plants in pure crystalline form. At that time it was learned that these suspected molecules are enormous, with molecular weights in the hundred-thousands, as contrasted with the mere tens or hundreds that represent the weights of ordinary molecules like those of sugar or gasoline.

Dr. Lauffer used a special container in the ultracentrifuge, in which an adjustable perforated barrier permits any desired fraction of the contents to be removed without disturbing the rest.

A solution of the disease virus was whirled in this container until just one fourth of it remained above the barrier. When this was removed and samples of it inoculated into healthy plants, it was found to have one fourth the disease-causing ability of the whole solution. This constituted strong statistical evidence for the identity of protein and virus.

The virus on which the Rockefeller Institute researches has been conducted is that of tobacco mosaic, one of the worst loss-causers in tobacco fields. However, that in itself is of less importance than the possibility of transferring the conclusions to apply also to other disease viruses, which include the microscopically invisible causes of such serious human ills as infantile paralysis, yellow fever, smallpox and influenza.

FRANK THONE

PROTEIN FROM CORN GERM

WITH meat shortages making every one increasingly protein-conscious, news that half-billion pounds of good protein a year may be made available for human consumption comes from the chemical laboratories of the University of Illinois. It is corn protein, in the germ or unsprouted plant tucked in the corn grain, which is at present used principally as animal feed because of the tendency of corn germ to turn rancid quickly.

A new kind of "de-fatted" corn germ, with this oil extracted and saved, has been put through a series of tests on laboratory animals by Dr. H. H. Mitchell at the university, who has now made a preliminary report to the National Research Council in Washington, D. C. In it he states that "except for the cashew nut, defatted corn germ is the only plant food we have studied, the protein of which possesses as high a biological value as lean meat."

To solve the problem, corn germ spoilage, a commercial firm in Monticello, Ill., the VioBin Corporation, has devised a method of extracting the oil at "pre-cooking" temperatures. The fat content is reduced to 2 per cent., moisture to 8 per cent., so that the keeping qualities of the defatted germ have been greatly improved. When the corn germ was found to be palatable to human beings, the University of Illinois began checking the nutritional values of this new food, hopeful of increasing the value of the corn crop.

Dr. Mitchell's feeding experiments showed that defatted corn germ contains 21 per cent. protein, which is 85 per cent. as digestible as beef protein and with a biological value quite as high. It is also rich in several vitamins and has a high mineral content. Its iron content assays at the exceptional figure of 300 parts per million.

AFRICAN MINERAL RESOURCES

AFRICA'S mineral wealth will undoubtedly figure importantly in the claims of European nations to colonial adjustments in the post-war period. Africa produces large quantities of essential metallic and non-metallic minerals which Europe lacks. Control of the African products is therefore an important advantage. Background information relative to the mineral resources of Africa is given in a new publication of the University of Pennsylvania Press, prepared by A. Williams Postel.

There are three principal metallogenetic provinces or mineralized areas in Africa. Along the Mediterranean is the iron-phosphate area. An area stretching from the Katanga district, in the Belgian Congo, down into Northern Rhodesia is reported to be the largest copper region in the world. It also produces radium and cobalt ores. The third great area is in South Africa, in the Transvaal and Southern Rhodesia. This area produces platinum, chromite and asbestos. The Belgian Congo now produces the 77 per cent. of Africa's diamonds, the rest being obtained in Angola, Gold Coast, the Union of South Africa and Sierra Leone.

Africa's known coal deposits are not very important, from the inter-continental standpoint. Petroleum is found only in small quantities, the principal supply being in Egypt, where production is only about 6,000,000 barrels a year, according to the U. S. Bureau of Mines. This is about the amount produced in 36 hours in the United States. Little lead and zinc ore has been found in Africa. Most other metals are found in commercial quantities.

Africa produces 99 per cent. of the world production

of diamonds, both for jewelry and industrial uses. It produces much gold, some 40 per cent. of the total world output.

In 1938 the continent produced over 47 per cent. of the world's supply of vanadium, used principally in special alloy steels. Peru is now an important source of this metal for American use.

Other principal African metal ores, and their percentage of world production, are chromium, 31 per cent.; manganese, 21 per cent.; copper, 18 per cent.; tin, 11 per cent.; and platinum, 9 per cent. Silver, iron, nickel, tungsten, molybdenum, titanium, lead, zinc, antimony and cadmium are all mined in exportable amounts.

Phosphates from North Africa constitute the most important non-metallic mineral. Approximately 36 per cent. of the world's supply came from this area before the war, and European agriculture depended upon it largely for its phosphate fertilizers. Fluorspar, asbestos and graphite were the other more important non-metallic products.

SPITTING COBRAS

SPITTING cobras do not really spit their venom, in their peculiar brand of chemical warfare; they squirt it through fang cavities modified in such a way that the thin jet of deadly stuff is thrown straight forward. This has been demonstrated in studies by Charles M. Bogert at the American Museum of Natural History.

Only a few species of cobras are "spitters." The fang cavity of the non-spitting kind runs straight down through the fang, to an opening just outside the tip and slightly above it. This is orthodox snake-fang structure; it functions like a hypodermic needle. A stream of liquid forced through is projected in the direction the fang itself is pointing.

In the fang of a spitting cobra, however, the channel takes a sudden turn as it reaches the discharge orifice, so that a forcibly ejected stream comes out at an angle of approximately 45 degrees to the front surface of the fang. The snake is thereby enabled to hold its fangs in normal position as it menaces its enemy or prey, and yet throw the venom-jet straight forward.

The eyes seem to be the invariable target, in encounters with spitting cobras, and hits can be scored at ranges variously reported to be as much as six to 12 feet. In human beings, venom produces immediate blindness, followed by severe pain and inflammation lasting several hours. There seems to be no permanent injury.

Mr. Bogert suggests that in addition to its defensive function against such enemies as man and mongoose, the spitting habit may aid in the capture of prey. Dr. David Macht, toxicologist of Baltimore, has informed him that the venom can be absorbed through the eyes of smaller animals, producing symptoms of general poisoning.

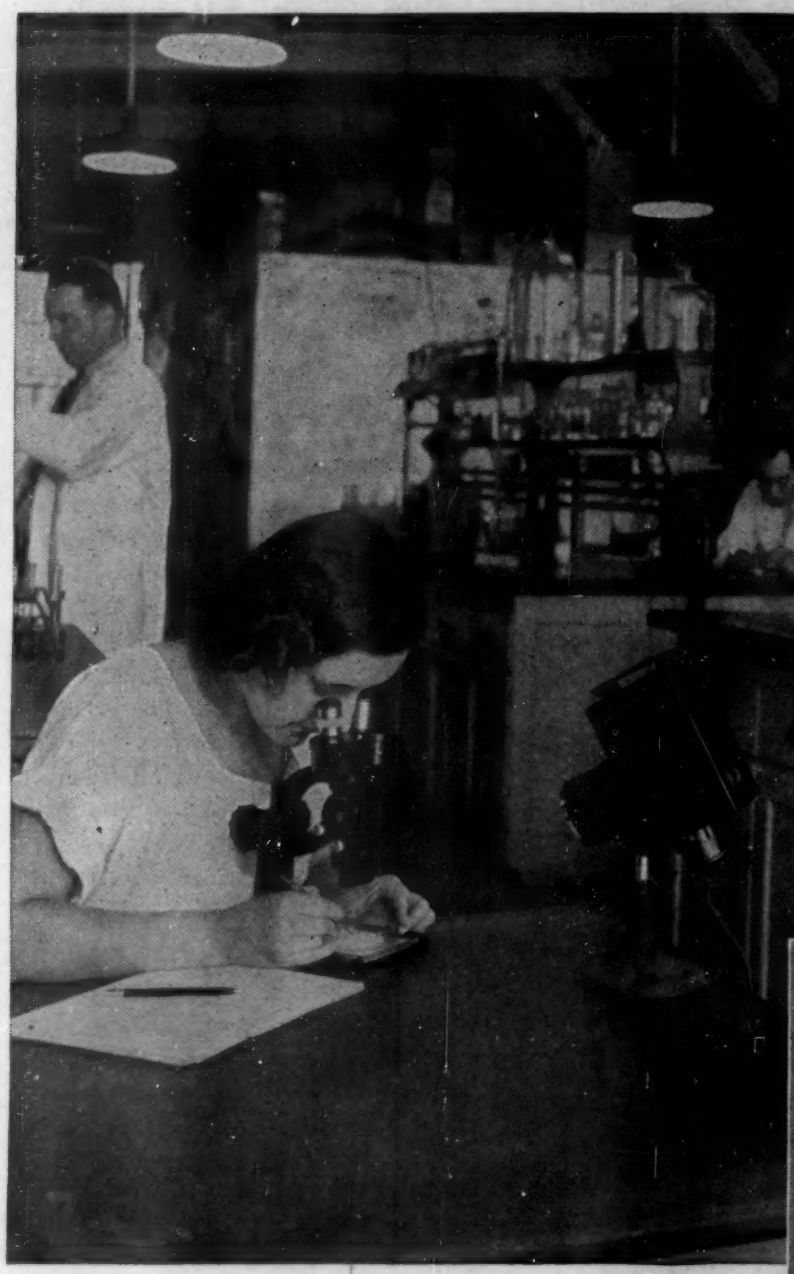
"Spitter" snakes are to be found in the tropics of both Asia and Africa. Despite their individually dangerous character, they do not constitute a really serious menace to the lives of our soldiers on overseas duty because they are not numerous, and most of them avoid trouble as much as possible. However, it is never wise to bend over a snake you think you have killed; some species have a wicked trick of "playing possum," and suddenly getting in one last lick at their attackers.

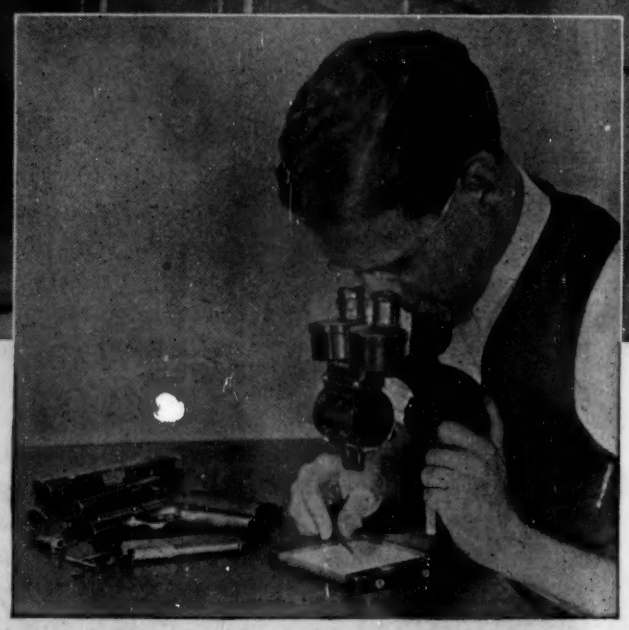
ITEMS

SUMMER'S end on August 31 (as the weatherman reckons it) leaves the densely populated Middle Atlantic region with a distinctive but unenviable record for one of the worst droughts in its history, U. S. Weather Bureau records show. "At Washington, D. C., near the center of the eastern drought area, the summer, June to August, was the driest since 1854, while the average summer temperature was the highest in more than 100 years," the meteorologists state. The drought area in the Southwest has persisted and continued to spread, until now a great dry zone grips the center of the country, from Kentucky to Nebraska, and from Missouri to Mississippi. Yet immediately to the north of that, in Iowa for example, there are complaints of too much rain, with dry, warm weather still badly needed to mature the corn crop. There have also been heavy rains in the Northwest and Northeast. In the latter region the drought, which had been shared with the Middle Atlantic region, was relieved though not fully broken. The late summer drought has been adding its effects to the already troublesome meat-supply problem by causing many cattle to lose flesh. By reducing the quantities of feed it will have a further, delayed effect during the coming winter and next spring.

WELDING layers of fibrous material together with synthetic resins has produced a plastic that is being drafted for sea duty. Plastic propeller-shaft bearings on sub chasers and other light war vessels are given longer life and flying salt spray only makes them run more smoothly. Metal bearings are corroded by salt water and the heavy wood sometimes used wears out nine times as fast as the plastic. V. E. Enz, Westinghouse marine engineer, states that "naval vessels can stay on active duty longer without drydocking for bearing repairs." Developed by Westinghouse, the plastic is also used for gears to prevent sparks in explosive atmospheres and as valve parts formerly made of bronze. Marine engines are "floated" on blocks of the plastic to reduce vibration and noise. This same plastic, Micarta, is being used by the Army for helmet liners.

THE War Production Board states that corundum, a natural alumina abrasive used in manufacturing grinding wheels for tools and lenses, is now being mined again in the United States for the first time since the last war. The mining operations are carried on in South Carolina. American needs for this important abrasive material have been met in the past years by importation from South Africa. A large plant for the treatment of boulder corundum is located at Pietersburg in Northern Transvaal. Corundum is reported to be widely distributed in the State of Musore, India. Little use of the Indian supply is reported. Corundum, after mining, is crushed and sized. The coarse-grain products are sold to manufacturers of grinding wheels and the fine products to optical lens grinders. The fine dust after use by optical instrument workers is sold to retail opticians. In 1940 the United States imported nearly 6,000 tons of corundum. The South Carolina mineral is reported to be of quality closely approximating the African product.





B & L Wide Field Stereoscopic Binocular Microscope AKW

From Foods to Firearms

All along America's war production line, from its start with the raw materials in the field, through the laboratory to the final vital inspections, Bausch & Lomb Wide Field Stereoscopic Binocular Microscopes are at work.

They are helping in the quality control and processing of foods to feed the United Nations . . . in the manufacture and inspection of arms for all the forces of Freedom. They are in daily use in the field, in the laboratory and the shop. Filling the gap in magnification between the hand lens and the compound microscope, the Wide Field Binocular Microscope offers a three-dimensional view of the object under examination. The user sees the object under magnification, but with full perception of depth and perspective.

Like many other Bausch & Lomb instruments developed for the peacetime needs of education, research and industry, today the B&L Wide Field Binocular Microscope is serving America's wartime needs . . . taking a place beside the actual instruments of war which B&L manufactures.

Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to peacetime pursuits when Victory is won.

For Bausch & Lomb Instruments essential to Victory—priorities govern delivery schedules.

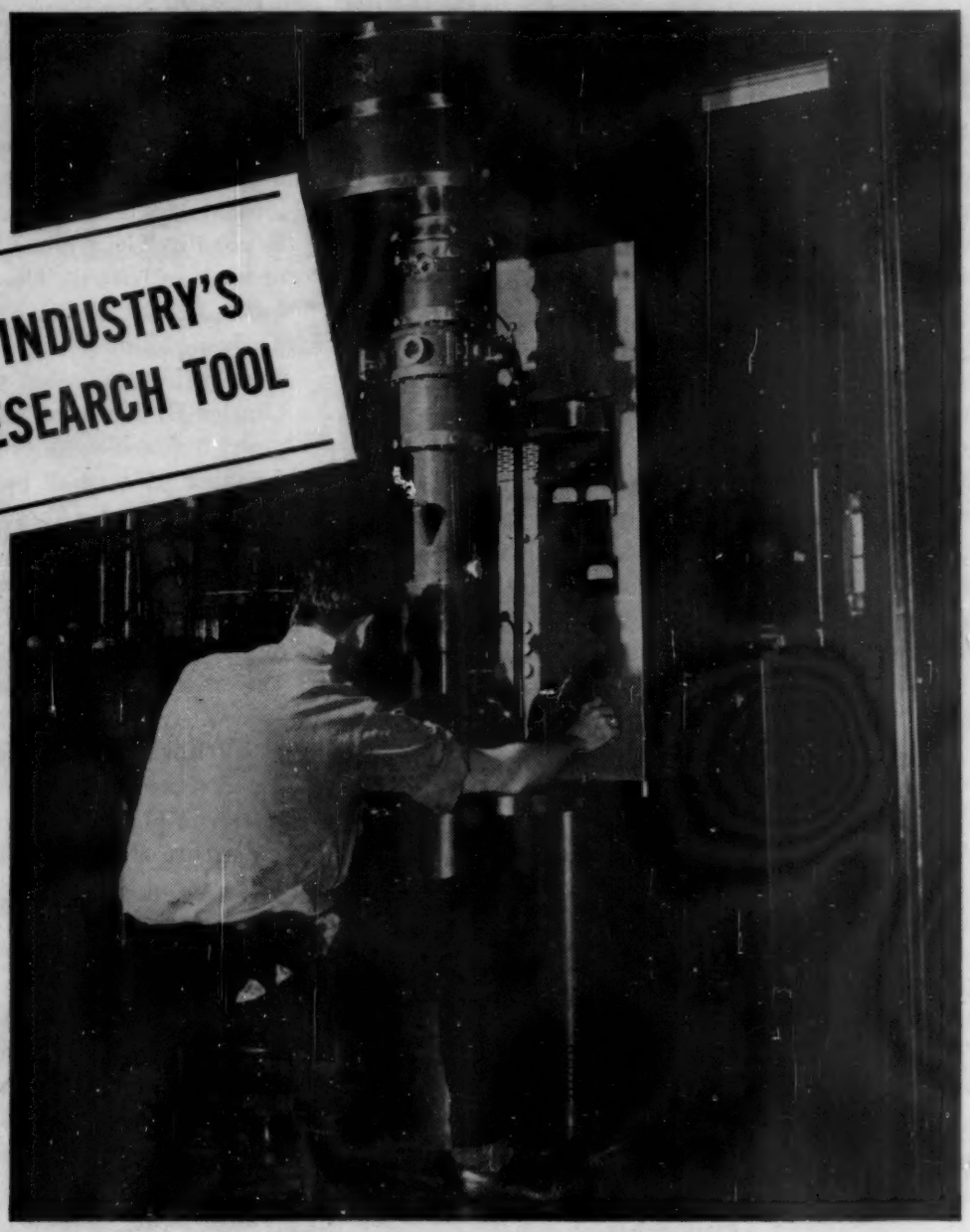
BAUSCH & LOMB

OPTICAL CO. • ROCHESTER, NEW YORK

ESTABLISHED 1853

AN AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION

SCIENCE AND INDUSTRY'S GREAT NEW RESEARCH TOOL



Dr. D. H. Reynolds at the RCA Electron Microscope installed in the Central Research laboratories of Monsanto Chemical Company.

Keen interest in the RCA Electron Microscope grows more and more general as new information is released about results obtained with this great research tool. Installed in nearly 50 of the most progressive industrial and institutional laboratories, many important discoveries have already been made with its aid.

In bacteriology, biology, metallurgy, chemistry, physics, and many other fields of research, the RCA Electron Microscope has abundantly proved its worth. Viruses, bacteria, fibers, catalysts, pigments, films, coatings, detergents, crystalline structures, plastics, particles, glazed and polished surfaces, are now being studied with such profound minuteness of detail as has never before been approached.

Objects hitherto of merely conjectural existence—subjects of speculative theory—are now exposed to direct observation, yielding definite knowledge and conclusions.

Effective use of the RCA Electron Microscope can be mastered readily by any competent laboratory technician.

For industries interested in product improvement—for scientists interested in pure research—it may answer problems which otherwise might remain unsolved for years.

Complete data or literature will be sent promptly on request. Please address RCA Victor Division, Radio Corporation of America, Camden, New Jersey.

RCA

RCA ELECTRON MICROSCOPE

SCIENCE NEWS

Science Service, Washington, D. C.

SOME PAPERS READ BEFORE THE PITTSBURGH MEETING OF THE AMERICAN CHEMICAL SOCIETY

DR. PER K. FROLICH, of the Standard Oil Development Company, in his presidential address before the American Chemical Society, stated that the danger of oil famine is not immediate. Taking a temperately optimistic view, and not trying to dodge present or anticipated difficulties, he still accepted an estimate of 300 years before the earth runs out of oil. This is assuming consumption at present rate, discovery of new reserves where they can reasonably be expected, and unhindered production and distribution.

The United States is especially favored as an oil-producing country, Dr. Frolich pointed out. While its boundaries enclose only 5 per cent. of the land area of the earth, it contains 15 per cent. of the area of the structures most favorable for the occurrence of oil fields. He estimated that the forty-six billion barrels thus far discovered and partly extracted in this country represent less than half of the oil we shall eventually contribute before the last American pool has been pumped out. A round hundred billion barrels was his estimate of America's share of the ultimate 600 billion barrels that all the world's oil fields, existing and yet to be found, should produce. Back of our oil reserves stand our coal beds, which contain an estimated three trillion tons. Coal accounts for more than 98 per cent. of our country's known energy resources, exclusive of water power. Methods for converting solid coal into liquid oil are already known and in use, and we can turn to them as our supplies of oil and natural gas run low and the cost of gasoline rises accordingly. Such gasoline from coal is not likely to be cheap, however. As compared with a cost of eight and a half cents a gallon from crude oil at two dollars a barrel, gasoline from coal has a cost ranging around twenty cents a gallon. Whether new processes could cut that cost is in the realm of prophecy rather than that of scientific estimate. The better part of wisdom would seem to be not to expect too much until you see it.

CHEMICAL research laboratories, often thought of as a luxury that only big businesses can afford, will operate for the benefit of small and middle-sized businesses as well, in the post-war era. At a symposium on this subject, the speakers told how the needs for research will be met by privately managed consulting laboratories and by government research workers as well as by laboratories owned and operated by the corporations themselves. Small businessmen were promised a share in the rapidly developing field of industries based on farm products, in the address of Dr. O. E. May, research coordinator of the U. S. Agricultural Research Administration. "These include," he said, "the dry and wet milling of cereal grains, processing of fruits and vegetables, production and processing of vegetable oils, meat packing, dairy products, feeds, fertilizers, insecticides and fungicides, pharmaceuticals, naval stores, fermentation products, rubber, leather, fibers and textiles." On all these materials, and many besides, the U. S. Department of Agriculture was conducting very active research in its four great regional laboratories when the war interrupted all programs. The laboratories are concentrating on war problems now, but as soon as victory has been won they will return to their normal activities. Conversion, Dr. May stated, will not be a difficult or lengthy process for most parts of the program. Small businesses will of course not be dependent entirely on what government scientists do for them. Charles H. Egan, of the Dewey and Almy Chemical Company, outlined some of the other research resources of the manager of a small business. Even a modestly financed plant can often afford to hire two or three research men, he pointed out, and it can also obtain more information by small research grants to be used in college and university laboratories. The resources and scope of activity of a professional consulting firm with a large laboratory were described by Raymond Stevens and Earl P. Stevenson, of Arthur D. Little, Inc. They pointed out that research is sometimes needed in the most surprising spots: for instance, anthropologists had to be called in when transport planes for paratroopers were being designed, to make sure the seats would fit the anatomies destined to sit in them.

ULTRASONIC waves, which are sound waves far too high-pitched for any ears to hear, have strange effects on mixtures and solutions, and may some day become a useful chemical tool, was stated by Professor Karl Sollner, of the University of Minnesota. Audible sound waves come at rates of a few hundreds or thousands per second; ultrasonics, which are started by crystals set into rapid pulsation by high-frequency electric currents, have rates up to a million or more per second. Their effects were first studied some years ago by Professor R. W. Wood, of the Johns Hopkins University, and Dr. A. L. Loomis, in the latter's private laboratory at Tuxedo Park, N. Y.; since then also by a number of other workers. The waves have been used to make permanent emulsions of such "unmixable" things as oil and water and even water and mercury. Acting on this hint, one investigator used them to homogenize milk so that the cream will not separate out. This use has not yet been commercialized. The waves also disperse exceedingly fine metallic particles through a suspending medium; Professor Sollner suggested their use in this way to produce special, ultra-fine-grained photographic emulsions.

HEATING plastic objects all the way through at the same time, by the same radio-wave treatment used in producing artificial fever in modern medicine, is the newest device to speed up the production of airplane instrument panels and steering wheels, radio housings and knobs, and all the ten thousand other plastic gadgets used in present-day war equipment. It has been given the convenience-name of "heatronic molding." It was described by V. E. Meharg, of the Bakelite Corporation. Use of high-frequency waves to produce heat in metal objects is not new, but it

WILEY

WILEY BOOKS
in GEOGRAPHY
for your V-12 and AST courses

PRINCIPLES OF HUMAN GEOGRAPHY

By ELLSWORTH HUNTINGTON, *Research Associate in Geography, Yale University;* Fifth Edition, largely rewritten, based on original work in collaboration with the late S. W. CUSHING.

In this book man's physical environment is clearly shown to influence human culture throughout the world. This result is achieved, first, by a logical development from geographic factors to culture traits rather than vice versa; second, by describing the minimum essentials of the background sciences such as geology, meteorology, and physiography in simple terms with an abundance of familiar illustrations; third, by a generous use of diagrams, maps, and pictures, appropriately inserted and effectively utilized in textual discussion; and fourth, by a style of writing which arouses and sustains interest.

Fifth Edition (1940). **594 pages; 6 by 9; $3.50**

COLLEGE GEOGRAPHY

By E. C. CASE, *Professor of Geography,* and D. R. BERGSMARK, *Associate Professor of Geography; both at the University of Cincinnati.*

"Case and Bergsmark" offers a general discussion of the all-important geographic factor of location and space relationship, chapters on human relationships to climate, soils and land forms, extensive discussions of the regional geography of the several climatic realms, chapters on mineral resources and industries, transportation and world trade, and an ample selection of charts, maps, and illustrations.

Second Edition (1940). **767 pages; 6 by 9; $4.00**

PRINCIPLES OF ECONOMIC GEOGRAPHY

By ELLSWORTH HUNTINGTON, assisted by FRANK E. WILLIAMS, *Professor of Geography, University of Pennsylvania,* SAMUEL VAN VALKENBURG, *Professor of Geography, Clark University,* and STEPHEN S. VISHER, *Professor of Geography, Indiana University.*

This book progresses from the simplest to the most complex elements of the subject. Special features are its analysis of principles governing the use of occupance of the land, the discussion of food crops as a part of a scheme of diet, and the study of environmental factors and their effort on the industries of the region and the energy and living standards of human beings. One part of the book covers cities, manufacturing, trade, and transportation.

(1940). **715 pages; 6 by 9; $4.00**

EUROPE

By SAMUEL VAN VALKENBURG and ELLSWORTH HUNTINGTON.

One-third of this book is given over to a study of Europe as a whole, and the remainder to the separate countries. It gives a balanced analysis of historical, social and political aspects of European development in their relation to geographical features. It leaves the student with a sense of the quality of European life. Ideally suited to the course offered in the Area and Language Program.

(1935). **651 pages; 6 by 9; $4.50**

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

has not been practical until lately to heat up non-conductors of electricity in this way. Now that means have been devised to make it work, it is being used to produce a more uniform, even heat throughout plastic objects of the thermosetting variety, in which one heating forms and hardens the plastic, which will not soften or change for any number of subsequent heatings. Hitherto it has been the practice to heat the die, which has meant that the heat flowed from the outside inward, and was not uniformly applied throughout the mass at the same time.

STEEL for war, with many of the properties of expensive alloy steels, can be made without the necessity of adding such hard-to-get elements as chromium and vanadium, according to Dr. Merle Randall, of the University of California. It is made by a special heat treatment of ordinary low-carbon steel. The process, which was originated by Dr. Randall's colleague, George F. Nelson, of Berkeley, Calif., consists in heating the steel very hot—up to 1,700 degrees Fahrenheit, and then suddenly quenching it in a 35 per cent. solution of either caustic potash or caustic soda. The metal can then be cold-rolled into sheets or bars without difficulty. Tests show it to possess an extraordinarily high strength.

WAR-NECESSARY sulfur can be salvaged from choking gas now wasted up the chimneys of factories, oil refineries and smelters, and turned from an irritating nuisance into hard cash. The process whereby this is accomplished was described by T. F. Doumani, R. F. Deery and W. E. Bradley, of the Union Oil Company of California. The waste gas is sulfur dioxide, the same suffocating fumes you smell when a sulfur candle is burned. It is an inevitable by-product of the refining of many types of crude oil, the burning of certain kinds of soft coal and the roasting of ores. In the new process this gas is passed over a catalyst at moderately high temperatures with the addition of hydrogen. The hydrogen takes the oxygen away from the sulfur dioxide to form water which comes off as steam. The sulfur comes off in pure form ready for use in vulcanizing rubber or for any of its other thousandfold industrial tasks.

KEYED to the wartime need for quicker answers to research questions is a method for testing the rust-preventing properties of paints, on which a report was given by Dr. G. D. Patterson and Dr. C. K. Sloan, of E. I. du Pont de Nemours and Company. Instead of painting a thick slab of steel and then waiting for the paint to begin peeling, a testing method requiring a year or more, a film only a thousandth of an inch thick is applied to small sheets of iron foil rolled to a uniform thickness of one two thousandth of an inch—about one eighth as thick as common newsprint paper. The foil is first cemented to small slips of glass, then the paint is sprayed on and the whole set-up is exposed to rust-provoking atmospheric conditions. With metal so thin, it does not take long for holes to be eaten clear through it, once rust gets started at all. The length of time a sample holds out before you can see through it in spots is a measure of the success of the paint under test.

LOOKING to a day when gasoline will be a permanent rarity in the United States and probably in the whole world, Dr. Gustav Egloff and Prudence Van Arsdell, of the Universal Oil Products Company, described progress already made in the development of motor vehicles that will run without gasoline. These are the producer-gas units, mostly trucks and buses but including many motor cars as well, that already ply the streets and roads in oil-less lands. They convert wood chips, charcoal, and a number of other solid fuels into gas, which is then fed into internal combustion engines. Dr. Egloff estimated that even now there are more than 800,000 such vehicles in operation.

THE possible existence of a new food factor necessary for reproduction, believed to be different from the already-known vitamin E, was suggested by H. W. Schultz, R. E. Gray and H. E. Robinson, of Swift and Company. The new vitamin (if that is what it is) appears to be present in meat, but is made useless by heating. Cats were used in the experiments. Some were fed on raw meat, others exclusively on meat that had been highly heated. Tomcats fed on the heated meat sired no kittens during a period of three and four years. Female cats similarly fed either had no kittens, or had very few, and those unhealthy.

COMMON white sugar is the purest chemical substance that most of us ever get to see; it is nearer absolute chemical purity than most of the laboratory compounds bearing the mark, "C.P." This very purity becomes a handicap for some purposes; one of the complaints sometimes heard against refined sugar is that it supplies energy without accompanying vitamins. That vitamins are not lacking in the source of sugar is indicated by results of analyses presented by William R. Jackson, of the research laboratory of Merck and Company. He worked both on whole cane from Cuba and Louisiana, and on raw sugarcane juice. His report: "Whole mature sugarcane is a fair source of thiamin and riboflavin, rich in pantothenic acid, and a good source of niacin."

IF you want to get all the sugar in some of our common vegetables, you'll have to eat them raw. This would seem to be one conclusion to be drawn from studies of E. Whitman Rice and Louis Lang, of the National Sugar Refining Company. They found that although onions, cabbage and carrots contain considerable percentages of sugar, they lose them in various steps involved in preparing them for the table. Carrots especially "bleed" sugar very freely. "A preliminary experiment with fresh carrots showed that 50 per cent. of the total solids were lost when the carrot was subjected to the common steps of precooking (blanching) before dehydrating and reconstituting before the final cooking. Losses in cooking will be additional to these mentioned. Further experiments seem to indicate that the losses of valuable food components of vegetables in certain methods of processing warrant a re-evaluation of some products. This is especially true during the present food shortage."

An Impressive Record

HOWE'S
INTRODUCTION TO PHYSICS

By HARLEY HOWE
Professor of Physics, Cornell University

559 pages, 6 x 9, 493 illustrations. $3.75

This immediately successful text has already established its leadership through a long list of adoptions which includes specialized Service training courses as well as regular academic classes. Institutions which have adopted the book include:

University of Alabama (AST)
University of Akron
Albany State Teachers College
Albertus Magnus College
Armstrong Junior College
Baldwin Wallace College (V-12)
Bowling Green State University
Bucknell University
California Polytechnic School
Canyon, Texas, State Teachers College
Cedarcrest College
Centenary College (AST)
University of Cincinnati
The Citadel
Citrus Junior College
Clemson College (AST)
Concordia College (AST)
Cornell University (AST)
Decatur, Miss., Junior College
De Paul University
Detroit Institute of Technology
Findlay College
Florida State College for Women
George Washington University
Georgia School of Technology
Goucher College
Green Mountain Junior College
Grinnell College
Hamilton College
Harvard University
Hobart College
Hunter College
Illinois Institute of Technology
Iowa Wesleyan College (AST)
Iowa State College
Jackson, Mich., Junior College
James Millikin University
McPherson College
University of Minnesota (AST)
Mississippi State Col. for Women
University of New Hampshire
New York University
University of New Mexico (V-12)
University of Nevada (AST)
Norwich University (AST)
University of Omaha
Parsons College
University of Pittsburgh
Queens College
University of Richmond (V-12)
Rochester Junior College
University of Rochester
St. Lawrence University (V-12)
St. Olaf College
Smith College
Stanford University
San Bernardino Junior College
University of South Dakota
Utah State College (AST)
University of Virginia
Syracuse University (AST)
Simmons College
South Dakota School of Mines (AST)
Vassar College
Wake Forest College
Washburn College (V-12)
Wheaton College
University of Washington
University of Wisconsin (AST)
U. S. Naval Academy
U. S. Naval Air Station, Atlanta

Teachers like *Introduction to Physics* because:

—it states physical laws in rigorous but non-mathematical terms

—it illustrates physical principles from the student's daily experience

—it incorporates more "modern physics" in the traditional organization of a first course

—it encourages the student to ask questions and to think for himself

—it includes a wealth of tested exercises, questions, examples, problems, and illustrations.

Send for a copy on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C. 2

SCIENCE NEWS

Science Service, Washington, D. C.

A NEW COMET

A NEW comet, named Diamaca after the Roumanian astronomer who discovered it, is reported low in the northern part of the evening sky near the constellation of Ursa Major, the great Bear. This comet should be seen with a small telescope as it is reported as of the eighth magnitude. Since stars of the first to sixth magnitude are visible to the naked eye, a little telescopic aid is needed to make it plainly visible.

The comet is located on the boundary between the constellations of Ursa Major and Lynx. Or, if you are not familiar with Lynx, look between Ursa Major and the bright star Capella in the constellation of Auriga, and it will be relatively near Ursa Major.

The comet was first noticed in Roumania early in the morning of September 10. Due to the difference in time, this was actually 10 P.M., EWT, on the night of September 9. It was found to be moving toward the northeast.

At the time of its discovery, the comet's right ascension was 8 hours, 35.4 minutes, according to the cabled report received by Dr. Harlow Shapley, director of Harvard Observatory, who has relayed the discovery news to American observatories. Its declination was plus 53 degrees, 1 minute.

The daily motion of the comet was noted to be plus 12 minutes, 43 seconds, in right ascension, and plus 2 degrees, 25 minutes in declination. With a simple star map and telescope, it will be possible to follow the path of the comet as it moves across the sky. American observatories have not had a chance to watch the comet and they may find the reported motion has changed.

Care should be taken not to confuse the comet with the numerous bright galaxies or spiral nebulae in this part of the sky, such as the well-known pair of galaxies as Messier 81 and 82, near which the comet may pass.

In the evening, the dipper is close to the northern horizon, whereas during the hours before dawn, it is high in the sky, and the comet much more favorably placed for observation.

The message of the discovery came from Zurich, Switzerland, via the observatory at Copenhagen, clearing house for astronomical information in Europe. Usually such messages are relayed to the United States *via* Sweden. It is not known whether the Nazi control of Denmark prevented its transmission to Sweden, or whether German-Swedish communications are limited.

ITALIAN TOPOGRAPHY

THE Italian peninsula is just a low broad mountain range with foothills and narrow coastal plains along the shores of the Tyrrhenian, Adriatic and Ionian seas in the north Mediterranean.

The principal through railroads and highways from south to north follow these coastal plains. Branch railways and motor roads run into the interior highlands. Zigzag routes permit travel northward through the highlands, but the roads that must be used by the bulk of the Allied armed forces are the two coastal routes.

On the entire west coast of the toe of Italy the mountains lie close to the sea. North of the province of Calabria, which occupies the entire toe, the coastal plains broaden until the Mt. Vesuvius and Naples area is reached. It is on this coastal plain that American troops are battling Germans who have the highlands in their rear.

The heel of Italy is largely a coastal plain. This plain extends northward to the Po valley, but is much narrower north of Foggia. North of Ancona, some 400 miles from the heel, it widens rapidly into the Po valley. San Marino, an Adriatic port, may be termed the southeastern end of the valley.

The great fertile V-shaped Po valley, extending from Turin to the Adriatic, separates the Italian peninsula from Alpine Italy. Its southern boundary is the Apennines which extend across Italy from Genoa in a regular line southeasterly to near Ancona on the Adriatic. They separate the Po valley from the Leghorn-Florence plains on the west coast.

Along the northeast slope of the Apennines passes the main line of the railroad which follows the east coast northward from the heel. It leaves the coast at San Marino north of Ancona, running almost directly to the northwest through Bologna, Modena, and Parma to Milan and Turin. A main line leaves this road at Bologna and runs directly northward across the Po to Verona and on through the Brenner Pass into Austria and Germany.

Two branch lines cut through the Apennines south of Bologna to Florence. One extends to Piso and Leghorn, and connects with the railway that runs south along the coast to Rome and beyond. The other runs inland from Florence to Rome. Other branch lines cut through the Apennines to connect Parma with the naval base city of La Spazia, and to connect Turin with Genoa.

The Apennines form a natural barrier to the invasion of the Po valley from the Genoa-Leghorn-Florence area on the eastern side of the Italian peninsula. Up the Adriatic coast by land, or up the Adriatic by sea, few natural barriers will be encountered.

THE shore of the Gulf of Salerno is described as flat and monotonous. The city of Salerno is at the northern extremity of the gulf. From Salerno a rocky projection stretches some twenty miles westward into the Tyrrhenian Sea; the flat coast extends some thirty miles to the south. Eastward and inland from Salerno lie fertile farms.

The Italian mountains are further back from the coast in this particular area than elsewhere on the coast from the toe of Italy to Mt. Vesuvius. The coastal plain extends in a flat triangular shape to the east, rising gradually in some places and abruptly in others. The apex of the triangle is roughly about fifteen miles inland near the

WILEY

NEW WILEY BOOKS

ERUPTIVE ROCKS

By S. JAMES SHAND, *Professor of Geology, Columbia University.*

A study of the petrology of the igneous rocks. The book discusses their origin and physical chemistry, the chemistry of the Earth, the composition of the interior of the Earth, the relation of eruptive rocks to ore deposits, and presents an original system of classification of rocks. A chapter is included on meteorites.

444 pages; 5½ by 8⅝; $5.00

FUNDAMENTAL RADIO EXPERIMENTS

By ROBERT C. HIGGY, *Assistant Professor of Electrical Engineering, The Ohio State University.*

Thirty-two basic experiments in electricity, electronics, and radio, with a full explanation of the principles involved, as well as the procedure to be followed in the laboratory. Suggestions on use of equipment, safety, and construction of equipment for the laboratory are included, and a large number of circuit diagrams are given.

95 pages; 5½ by 8⅜; $1.50

ELECTRONIC INTERPRETATIONS OF ORGANIC CHEMISTRY

By A. EDWARD REMICK, *Assistant Professor of Chemistry, Wayne University.*

Equally adaptable as a textbook or as a working guide to procedure in using the electron theory for the solution of laboratory problems in pure or applied chemistry. The book presents the history of the English theory, a critical discussion of it, and its applications.

474 pages; 5½ by 8⅝; $4.50

LABORATORY MANUAL OF EXPLOSIVE CHEMISTRY

By ALLEN L. OLSEN, *Instructor of Chemistry,* and JOHN W. GREENE, *Professor of Chemical Engineering; both at Kansas State College.*

A laboratory manual for explosives courses given to ordnance inspectors, and for courses in the subject for chemistry majors. Gives factual information, laboratory procedures and explanatory notes on explosive chemistry. Important manipulative techniques are described.

106 pages; 5½ by 8⅝; Probable price, $1.75

PRINCIPLES OF ELECTROCHEMISTRY

By H. JERMAIN CREIGHTON, *Professor of Chemistry, Swarthmore College.*

Volume I of a two-volume treatise on the principles and applications of electrochemistry. The new edition includes discussions of the notable advances that have been made in the science of electrochemistry since the previous edition was published.

Fourth Edition: Approximately 490 pages; 5½ by 8⅝; $5.00

PATHOLOGY IN FOREST PRACTICE

By DOW V. BAXTER, *Associate Professor of Silvics and Forest Pathology, University of Michigan.*

An eminently practical treatment of the subject of forest pathology, designed to provide a working knowledge of the conditions which cause disease and of the practical measures which can be taken to reduce its incidence or its severity.

Approximately 596 pages; 6 by 9; $5.50

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

city of Eboli which is located at the opening of a pass through the coastal range of the Apennines. By way of this pass roads lead to the interior, and to the south reaching the gulf of Taranto some miles west of the city and great naval port of that name.

The southern end of the thirty-mile flat shore is near the town of Agropoli. Southward from there all the way to the toe, a distance of about two hundred miles, the coastal plains are narrow. Mt. Vesuvius lies about fifteen miles north of the city of Salerno, and Naples another fifteen miles or so beyond.

SOME PAPERS READ BEFORE THE PITTSBURGH MEETING OF THE AMERICAN CHEMICAL SOCIETY

(Continued)

BRAN is usually looked upon as low-value stuff; moldy bran would ordinarily be considered quite worthless. Yet nowadays industrial chemists are deliberately making bran moldy, and getting out of the mold a substance that splits starch down into sugar for fermentation into alcohol, used for a thousand war purposes all the way from smokeless powder to synthetic rubber. New methods for producing and processing these suddenly valuable molds were described by J. Ziffer, M. Rosenblatt and A. J. Liebmann, of the Schenley Research Institute, Inc., at Lawrenceburg, Ind. They stated that they can get full growths of them in from thirty-six to forty-eight hours, and have them dried and ready for processing in about an equal additional time-period.

BUTTEROIL, which is practically pure butter-fat in semi-liquid form, and is much used in the food industries, has been prepared in a way that makes it keep longer by M. S. El-Rafey, G. A. Richardson and J. L. Henderson, of the University of California Agricultural College at Davis, Calif. This improvement in processing may have important bearing on post-war food handling. Butteroil is prepared in several different ways, but the objective is always the same: to remove all the water, milk proteins, and other non-fat substances found in butter. In the new California process the water and substances that can be boiled off are removed by cooking in an open kettle before the proteins are taken out. This results in a product with a flavor that appeals to many persons.

PREDICTING yields of peaches in various parts of an orchard by analyzing leaves from the trees while the fruit is still small and green is the newest refinement in fertilizer practice. The chemists heard about it from P. D. Caldis, A. R. Brown and R. T. Marks, of the California Packing Corporation. The matter principally under investigation was the exact potash requirement from area to area in the orchard's variable soil. Analysis of the leaves for potassium showed how well or badly off the trees were in this vital chemical element. Using these analyses as guides, the potash applied to the orchard soil was adjusted until now the yield of number one fruit was increased by nearly five tons to the acre.

ITEMS

DENGUE fever has broken out in Honolulu. Reports just received by the U. S. Public Health Service indicate that 76 civilians were stricken up to August 20, the number of cases nearly doubling in about 10 days. Airmen returning from the southwest Pacific are believed to be the source of the infectious disease. Mosquito eradication measures are being pushed, as the disease is spread by the same mosquito species that carries yellow fever. Dengue, also known as breakbone fever or dandy fever, is believed caused by a virus which mosquitoes pick up by biting a patient who has it in his blood. Symptoms come on suddenly after an incubation period of three to six days. Fever goes up rapidly and may reach 105 degrees. Severe pains are felt in the joints, muscles, head and eyes, often accompanied by sore throat and catarrhal symptoms. After three or four days the temperature drops to normal and the patient feels better. But there is usually a relapse after a day or two and a rash like measles appears. Dengue occurs mainly in Persia, Egypt, India and the West Indies, where there are sporadic epidemics.

UNLESS new oil finds or imports are increased civilians face a further cut in use of gasoline and oil, Harry C. Wiess, president of the Humble Oil and Refining Company, states in a report to the American Institute of Mining and Metallurgical Engineers. More than 4,150,000 barrels of American oil are being used at home and abroad every day and requirements for next year may average over 4,400,000 barrels. Although military demands can not be revealed, the production of aviation gasoline alone in this country already exceeds the crude oil production available to Germany from its own fields and those of Hungary and Rumania. "Motorists may well ask," says Mr. Wiess, "why further rationing should be discussed if passenger cars are currently using some 500,000 barrels daily less gasoline than before the war, while the nation has increased its production of crude oil. The answer is to be found in the drastic changes that have occurred in refinery operations in order to supply aviation gasoline, materials for the synthetic rubber program, and other war products." We have about reached the peak of our efficiency in production, Mr. Weiss believes, and that peak is about 250,000 barrels per day short of the estimated daily need for 1944. He believes that the least desirable solution to the problem is further increased production at the risk of depleting our reserves, since less oil can be recovered when overproduction is attempted.

THE infantile paralysis outbreak is continuing without let-up, cases continuing to increase, latest reports to the U. S. Public Health Service show. The total for the nation, exclusive of Arizona, was 865 the week ending August 28. The previous week's total was 747. How the report from Arizona will affect the picture is hard to say, as that state reported no cases last week. Hardest hit state was Illinois with an increase from 117 cases the week ending August 21 to 194 the week August 28. California had a decrease, from 163 to 138. Texas reported an increase from 52 to 75. Cases in Nebraska increased from 5 to 17; in Washington from 20 to 25; in Oregon from 11 to 24; in Missouri from 14 to 24. Decreases were reported in Connecticut, Oklahoma, Kansas, Kentucky and Utah.

Five Outstanding New Books

THE STRUCTURE OF METALS. Crystallographic Methods, Principles, and Data

By CHARLES S. BARRETT, Associate Professor of Metallurgical Engineering, Carnegie Institute of Technology. *Metallurgy and Metallurgical Engineering Series.* 563 pages, 6 x 9, $6.00

A new text and reference book that gives special attention to recent advances in the field. Covers structures, properties, theories of metals and alloys, and the crystallographic techniques of physical metallurgy. Also contains extensive reviews (with bibliographies) of branches of the field of special interest at this time, particularly those for which adequate reviews are not readily available in other books in English.

THE PHYSICS OF METALS

By FREDERICK SEITZ, Professor of Physics and Department Head, Carnegie Institute of Technology. *Metallurgy and Metallurgical Engineering Series.* 330 pages, 6 x 9. $4.00

An entirely nonmathematical treatment of the developments of the physics of metals that have taken place in the past 15 years. The topics treated include the structure of metals, factors determining the stability of alloys, the theory of plasticity of metals, diffusion in metals, the theory of iron-carbon alloys, the electron theory of solids and its applications to cohesion, magnetism, and conductivity.

FUNDAMENTALS OF OPTICAL ENGINEERING

By DONALD H. JACOBS, Associate Physicist, National Bureau of Standards, Washington, D. C. 458 pages, 6 x 9. $5.00

Offers a comprehensive introduction to the methods and principles of optical design. After outlining the fundamentals of optics, the author gives an analytical description of the functioning and design of representative military optical instruments. In the next section the basic principles of the mechanical design of optical instruments are stated. The book concludes with an introduction to optical design that will enable the student to design aplanatic objectives and eyepieces.

HEAT AND THERMODYNAMICS. *New second edition*

By MARK W. ZEMANSKY, Associate Professor of Physics, College of the City of New York. 386 pages, 6 x 9. $4.00

Presents the fundamental concepts and laws of thermodynamics, together with a discussion of the technique of applying these principles to specific problems. The second edition includes treatments of convection, entropy and nonequilibrium states, second order phase transitions, superconductivity, heat capacity of reacting gas mixtures, LeChatelier's principle, etc. Many new problems have been added.

AN INTRODUCTION TO WEATHER AND CLIMATE. *New second edition*

By GLENN T. TREWARTHA, Professor of Geography, University of Wisconsin. *McGraw-Hill Series in Geography.* 535 pages, 6 x 9. $4.00

A leading textbook in its field. Brings the student the latest research information on climatic regions and climatic types, describing their characteristics, explaining the origin of these types and regions, and showing how climatic controls acting upon climatic elements produce the various types and varieties of weather and climate.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, WC.2.**

SCIENCE NEWS

Science Service, Washington, D. C.

CENTENNIAL OF THE ROTHAMSTED EXPERIMENTAL STATION

ONE hundred years old this year, the famous Rothamsted Experimental Station at Harpenden, England, is now celebrating its centennial in spite of the war. It is reputed to be the oldest agricultural research institution in the world. The founder of the research station, Sir John Bennet Lawes, remained its active director until his death in 1900. Sir Joseph Henry Gilbert, a chemist, was associated with him during these 57 years. He died in 1901.

When the station was established chemistry was thought to be the only science that seemed to bear on agriculture. For that reason first emphasis was placed on chemical problems having to do largely with the feeding of plant life, and out of it came the creation of what were then called artificial fertilizers.

To carry out the work of making satisfactory artificial fertilizers, and to test the compounds and mixtures made, experimental plots were established and the new fertilizers tried on various crops. The famous wheat plots on Broadbalk carried this year their hundredth consecutive crop of wheat. Other plots have carried other consecutive crops for many years.

The chemistry of farm animal feeding also received early attention at Rothamsted. Animals were fed special diets over specified periods, were then slaughtered, and their body contents analyzed chemically. This early work established the basis for all the later qualitative studies of animal nutrition.

Rothamsted's work to-day includes all branches of scientific agriculture. Its main objective is still the objective set by its founder. As stated by the British Council, "This purpose of gaining knowledge, of developing a subject that experts can use and of providing basic information for teachers, farmers, inventors and all interested, has always been uppermost at Rothamsted."

Sir John Lawes started the Rothamsted station on his own inherited estate. He used his lands even before creating the research center for farm demonstration work. Whether or not the idea of this work and the establishment of a scientific station originated with him is not certain. Others had proposed similar undertakings at an earlier date. Antoine Laurent Lavoisier, the great eighteenth-century French scientist, who was born just a hundred years previous to the establishment of Rothamsted, started a model farm in 1778, and in 1785, while secretary of the French Committee on Agriculture, he recommended the establishment of agricultural experiment stations.

In the United States the first agricultural experiment station with state support was the Connecticut station, established in 1875. By 1887 there were eighteen stations, although some had only meager support. In that year Congress passed the far-reaching Hatch Act, which gave Federal financial assistance for experiment stations connected with all the land-grant state agricultural colleges established under the well-known Land Grant Act of 1862.

MAPS OF THE U. S. GEOLOGICAL SURVEY

MANY strategic areas in America are being adequately mapped for the first time, using methods three to five times as fast as pre-war methods, William Emory Wrather, director of the U. S. Geological Survey, reported recently to Secretary of the Interior Harold L. Ickes.

Less than half of the United States has been comprehensively plotted, Mr. Wrather disclosed, despite the 167 years of our national existence. Much of the area requiring additional mapping lies in the central and western states. But there are also regions along the coast which have not been mapped to show the actual shape and elevation of land surface, streams and drainage, the location and extent of cities and towns, roads, dams, forests, boundary lines and other culture.

"In certain strategic areas along the coastline," Mr. Wrather reported, "military requirements have resulted in a 60 per cent. increase over last year in the square mileage of mapping produced monthly by the topographic branch of the Survey." Of 228 areas in which mapping was completed last year, 166 were required by the military.

Improved stereoscopic plotting of aerial photographs, called photogrammetry, is only about a third as expensive and much faster than former methods when used under favorable conditions. In effect the procedure brings the terrain right into the laboratory. To get a three-dimensional view, the operator views plates of aerial photograph negatives through an optical system which is basically like the stereoscope through which the older generation once peered for natural-depth scenic views as a parlor pastime.

By moving a small plotting device, called a tracing table, over the map sheet, the operator then makes a pencil drawing of the culture, drainage and contours. A photographic copy of the drawing is then taken to the field for checking features that could not be identified on the photographs and to secure names to be lettered on the map.

Post-war uses, as well as military service, is foreseen for the maps, since they are valuable in planning and executing flood control, river and harbor improvements, power and irrigation projects, highway location and construction, forest administration, erosion control, drainage enterprises and mineral and soil surveys.

STAR IN THE CONSTELLATION OF LIBRA

THE shell of a star in the constellation of Libra, which is not now visible in our evening sky, is composed of many intensely hot layers, each rotating at its own speed.

A layer of nickel in a gaseous state is on the outside of 48 Librae, and titanium and probably manganese, are in the deeper strata, Dr. Otto Struve, director of Yerkes Observatory, reports in the *Astrophysical Journal* for July.

WILEY

WILEY BOOKS

in MATHEMATICS

for your V-12 and AST courses

A FIRST YEAR OF COLLEGE MATHEMATICS

By HENRY J. MILES, *Associate in Mathematics, University of Illinois.*

607 pages; 191 illus.; 5½ by 8½; $3.00

CALCULUS

By EDWARD S. SMITH, *Professor of Mathematics,* MEYER SALKOVER, *Associate Professor of Mathematics,* and HOWARD K. JUSTICE, *Professor of Mathematics; All at the University of Cincinnati.*

558 pages; 6 by 9; $3.25

ANALYTIC GEOMETRY

By EDWARD S. SMITH, MEYER SALKOVER, and HOWARD K. JUSTICE.

298 pages; 255 illus.; 6 by 9; $2.50

COLLEGE ALGEBRA

By H. P. PETTIT, *Professor and Head of the Department of Mathematics,* and P. LUTEYN, *Assistant Professor of Mathematics, College of Engineering; both at Marquette University.*

Second Edition: 247 pages; 28 illus.; 5½ by 8½; $1.90

COLLEGE ALGEBRA

By LOUIS J. ROUSE, *Assistant Professor of Mathematics, University of Michigan.*

Second Edition: 462 pages; 22 illus.; 5½ by 8; $2.25

CALCULUS

By FREDERIC H. MILLER, *Associate Professor of Mathematics, The Cooper Union School of Engineering.*

419 pages; 118 illus.; 6 by 9; $3.00

CALCULUS

By HENRY B. PHILLIPS, *Head of the Mathematics Department, Massachusetts Institute of Technology.*

353 pages; 162 illus.; 5 by 7¼; $3.00

TRIGONOMETRY

By HOWARD K. HUGHES, *Associate Professor of Mathematics,* and GLEN T. MILLER, *Assistant Professor of Mathematics; both at Purdue University.*

With tables: 268 pages; 95 illus.; 5⅛ by 8⅛; $2.00

Without tables: 189 pages; 95 illus.; 5⅛ by 8⅛; $1.50

PLANE TRIGONOMETRY WITH TABLES

By HARVEY A. SIMMONS, *Associate Professor of Mathematics, Northwestern University,* and GREENVILLE D. GORE, *Chairman, Department of Mathematics and Engineering Science, Central Y.M.C.A. College.*

282 pages; 133 illus.; 5½ by 8½; $2.00

DIFFERENTIAL EQUATIONS

By HARRY W. REDDICK, *Professor of Mathematics, The Cooper Union School of Engineering.*

245 pages; 5⅛ by 8¾; $2.50

DIFFERENTIAL EQUATIONS

By HENRY B. PHILLIPS.

Third Edition: 125 pages; 5 by 7¼; $1.75

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

The outermost layers of the shell rotate slowly, while the inside layers revolve much more rapidly, according to the estimate of Dr. Struve. The layers within the shell seem to be slightly expanding at certain times, and contracting at others, adding to the complexity of the action of the stratified shell.

"The star 48 Librae presents a notable paradox," according to Dr. Struve. It combines many of the characteristics of a supergiant and a main-sequence star. The star lying beneath these thin whirling metallic layers seems to be a relatively well-behaved main-sequence B-type star. At present the shell is fairly transparent in the ordinary photographic region of the spectrum, but is essentially opaque toward the violet end.

The spectrum of the star has undergone a distinct change in recent years, reflecting changes within the star itself. During the last ten or twenty years a strong metallic absorption spectrum has developed, showing that the light from the hot center of the star was shining through an increasing number of metallic gases with temperature lower than that of the inner source of light.

The spectrum of 48 Librae is believed to denote a shell in many ways resembling the shell of Pleione as observed in 1940.

THE TREATMENT OF IMPETIGO

FROM a combination of Indian dislike of bandages and medical skill has come a twenty-four-hour conquest of one of the most persistent of skin infections, impetigo contagiosa.

The new treatment consists of placing on the sores a jelly consisting of 25 per cent. sulfadiazine in methyl cellulose. This mixture forms a water-soluble plastic coating over the lesions and obviates the need of bandages. The sulfa drug is effective in healing the surface sores caused by the impetigo bacteria and seldom is more than one application necessary.

Dr. and Mrs. M. Pijoan, together with F. Worman, working at the U. S. Indian Service Nutrition Laboratory and the University of New Mexico, developed the treatment. The research was reported through *Southwestern Medicine*. Since the work was done, Dr. Pijoan has been commissioned a lieutenant in the Navy and is on the research staff at the Naval Medical Research Center, Bethesda, Md.

Treatment of impetigo afflicting Indian patients was found by Dr. Pijoan to be particularly difficult because they consider bandages over skin sores somewhat of a disgrace. The patients tore off the dressings once they were out of sight of the doctor.

A search was begun for a method of treatment that did not require bandages. It resulted in the sulfadiazine-methocel dressing. Earlier researches showed that sulfonamide ointments or microcrystals gave striking results, while sulfa drugs in methyl cellulose had been used successfully in treating burns. The new impetigo treatment was developed from both techniques. Controlled tests on a hundred Spanish-American school children showed the effectiveness of the treatment.

ITEMS

THE Pacific coast of Guatemala probably received a moderate shaking from an earthquake on September 23 that seismological reports, interpreted by the U. S. Coast and Geodetic Survey, locate in the Pacific Ocean near 15 degrees north latitude and 92 degrees west longitude. The seismological stations reporting included St. Louis University, Georgetown University, Spring Hill College, Spring Hill, Ala., and Coast and Geodetic Survey stations at Tucson, Ariz., and San Juan, Puerto Rico.

THE worst infantile paralysis year since 1931, with new cases still occurring throughout the nation at a weekly rate of 1,000 or more, would have taken a much higher toll if the nation had not fortunately been well prepared with money and equipment for fighting the disease. Credit for this life-saving preparedness is given to local chapters of the National Foundation for Infantile Paralysis by the foundation's president, Basil O'Connor. Mr. O'Connor has recently made a transcontinental trip in which he visited some of the stricken areas, including California and Chicago, where the outbreaks have been particularly serious. "Americans helping other Americans with money given freely" during the public celebrations of President Roosevelt's birthday last January 30, Mr. O'Connor said, is what made it possible for communities to have on hand both equipment and trained personnel for immediate action when the epidemic struck.

ALL refiners of 100-octane aviation gasoline may take advantage of a new method of manufacturing that will speed up the production of this essential high-test fuel for warplanes. This process has been developed by the Universal Oil Products Company, of Chicago, who have announced that it will be released to any refiner interested as a contribution to the war effort. The process consists in converting pentane into isopentane, both of these compounds being contained in the base stock from which gasoline is made. Isopentane is an essential component of 100-octane gasoline, but the amount of it in natural gasoline is not sufficient to make aviation gas, so what is called an isomerizing process is necessary to increase the amount by converting some of the normal pentane in the gasoline into isopentane. The process recently discovered does this efficiently and economically, it is claimed, and is reported to be simple, continuous in operation and easily controlled.

THE production of agar on the Pacific Coast and careful use of the quantities available have given America enough agar for the essential bacteriological media needed in medical laboratories. This jelly-like substance made from seaweed was a Japanese product before the war, but agar of bacteriological grade is now being successfully extracted from seaweed of our Pacific Coast. A WPB limitation order prevents the use of the limited supply for industrial, food or therapeutic purposes. Agar industry on the Atlantic Coast is getting underway, but so far its product is not suitable for bacteriological use.

WILEY

WILEY BOOKS
in PHYSICS
for your V-12 and AST courses

INTRODUCTORY COLLEGE PHYSICS

By OSWALD H. BLACKWOOD, *Professor of Physics, University of Pittsburgh.*

The simplicity of presentation in this book, its consistency and exactness of statement, make the subject readily understandable to students with little or no previous knowledge of mathematics or physics. It stimulates the student's interest in physics by demonstrating principles and applications through abundant references to daily life; in addition, the numerous problems and illustrations deal with common associations. Ample summaries and review questions are included. Emphasis throughout is on reason rather than memory.

(1939). **487 pages; 417 illus.; 6 by 9; $3.50**

GENERAL PHYSICS: A Textbook for Colleges

By OSWALD H. BLACKWOOD.

"General Physics" follows the same structure as the author's "Introductory College Physics," but the material is more comprehensive; the content represents an amplification of the earlier book. The treatment in "General Physics" is simple, yet rigor has been maintained. It supplies the requisite information to enable the student to answer 98% of the questions in the National Cooperative Physics Test. The text is amply illustrated, and supplemented by a large number of problems, grouped according to difficulty. A set of more difficult problems is included in the appendix.

(1943). **622 pages; 360 illus.; 5½ by 8¾; $3.75**

COLLEGE PHYSICS

By JOHN A. ELDRIDGE, *Professor of Physics, State University of Iowa.*

Known for its method of easy approach to the subject as a whole, this book stays on the college level. It satisfies the natural curiosity of the student and shows relationships and social and economic conditions. It successfully combines the discoveries and theories of modern physics with the principles of classical physics. The book appeals to the student with only a general interest in the subject and at the same time gives a solid foundation for the student with a direct professional interest in physics.

Second Edition (1940). **702 pages; 452 illus.; 5½ by 8½; $3.75**

GENERAL PHYSICS FOR STUDENTS OF SCIENCE

By ROBERT BRUCE LINDSAY, *Hazard Professor of Physics, Brown University.*

Provides the basis for an introductory course in college physics, for those students who have had mathematics through elementary calculus. It may equally well be used by students who have already had an elementary non-mathematical course in physics, as an intermediate and more thorough treatment and to a certain extent as an elementary introduction to classical theoretical physics. Special attention is given to the presentation and definition of basic concepts. Problems of varying degrees of difficulty are given at the end of chapters.

(1940). **534 pages; 265 illus.; 6 by 9; $3.75**

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

SCIENCE NEWS

Science Service, Washington, D. C.

FOOD FOR ITALY

THE Allies are reported to be helping to feed the Italian population now in areas from which the Germans have been driven, and will have to continue to do so until 1944 crops are harvested. This year's surplus olive oil, citrus products and sulfur may be used in payment, in part at least.

Italy's crops this year are reported good. The season has been favorable. Fertilizers were available. Manpower shortages were overcome. The wheat crop is estimated by the U. S. Department of Agriculture to be the biggest ever produced in that country. How much of it will be available to Italians is a question. Their wheat areas are in the Po valley and to the north, where the country is now under the control of German forces. The winter fruit and nut country is also in the north.

Fish food from the Mediterranean can supply much of the need if fishing experts show the way and equipment is furnished. Italy, surrounded by water, has never developed an extensive fishing industry. Sardines from Sardinian waters and tuna from Sicilian seas have constituted the principal export catch. Much other fish may be taken and the Mediterranean is now safe for activities.

"Agricultural production in Italy during the 1943–44 crop year is not expected to be handicapped by any serious lack of commercial fertilizers," states the U. S. Department of Agriculture in a recent release, "unless the Nazis damage or requisition the output of domestic plants which in recent years have supplied most of the country's nitrogenous fertilizer requirements. Adequate phosphate should be available from North Africa. Potash, heretofore supplied almost entirely by Germany, constitutes a very minor part of Italy's annual fertilizer consumption."

The productivity of Italian soil is dependent on commercial fertilizers. The amount used in the past dozen years or so is considerably greater than in previous years. Italy was cut off from North African phosphates for only a short while so that the soil has not been impoverished by war conditions.

MT. VESUVIUS

NORTHWEST of Salerno is the famous volcano Vesuvius, which in 79 A.D. erupted and buried the ancient Roman cities of Pompeii and Herculaneum under deposits of ashes and lava from ten to sixty feet deep. Its western slopes extend to the shores of the Gulf of Naples. It is less than ten miles from the city itself.

Armies *en route* from Salerno northward, after crossing the mountainous promontory, the Sorrentine peninsula, which separates the Gulf of Salerno from the Gulf of Naples, pass through some ten miles of fertile farm country occupying the plains between the peninsula and the southern slopes of Mt. Vesuvius. They follow along the coastline or detour to the east up the valley between the volcano and the Apennines. By the coast route it is about thirty miles from Salerno to Naples.

The slopes of Mt. Vesuvius are fertile lands which produce large quantities of food in normal times. The disintegrated lava and the ashes emitted from the volcano have made a productive soil rich in plant food. The slopes are noted for their vineyards from which some of Italy's finest wines are made.

Vesuvius has erupted many times since the great catastrophe in the first century. Lives were lost in many of these outbreaks, but they were few in comparison with the estimated 18,000 lost in 1631, when a very great convulsion occurred. This had been preceded by a period of 130 years of inactivity in which trees and brush grew in the crater among which herds of cattle grazed without a thought of the dangers beneath them.

During the eighteenth and nineteenth centuries Vesuvius was active many times with at least ten eruptions that may be classed as of major importance. A period of increased activities began again in May, 1905, with a flow of lava lasting until April, 1906, when a very violent eruption occurred. A minor outbreak took place in 1913, and during the years 1926 to June, 1929, streams of lava issued from the volcano at various places many times. Since then Vesuvius gives plenty of evidence that it is still alive. Dangerous gas, smoke or steam issue from it almost constantly.

WHITE RUSSIA

WHITE RUSSIA is one of the six republics which were included in the Union of Soviet Republics. The westward paths of retreating former occupants of the Smolensk district are through its forests, over its grain and grazing lands, or across its many swamp and marsh areas. A stretch of land from Smolensk southeasterly through Minsk to Warsaw follows roughly the divide or watershed, with rivers running north to the Baltic and south to the Black Sea. The region about Minsk, 1,000 feet above sea-level, is the highest area along the route.

White Russia occupies an area of nearly 5,000 square miles extending from the border of pre-war Poland eastward to the Smolensk and the Bryansk provinces. The Pskov district is to its north, and on its south is Ukrainia. About a quarter of its area is forest land. A large section in its southeast is swamp and marsh land hard to cross in warm weather but firm and solid when frozen. The rest of White Russia is grain and grazing land, not suitable for general agriculture.

About four million of the five million pre-war population of this division are White Russians. This name distinguishes them from the Great Russians, which constitute the population of most of Russia, and from the Little Russians, or Ukrainians. The White Russians are said to be the purest of these three great Slav divisions. They are akin to the Poles and larger and blonder than the Great Russians.

White Russians are said to take their name from the garments long worn by them—white homespun smocks and white leggings.

An Impressive Record

◆

STORER'S

GENERAL ZOOLOGY

By TRACY I. STORER

Professor of Zoology, University of California at Davis

McGraw-Hill Publications in the Zoological Sciences

798 pages, 6 x 9, 551 illustrations, 5 colored plates. $3.75

This outstandingly successful basic text has already been adopted by over 60 colleges and universities. The following institutions are representative:

University of Arizona
Brown University
University of California
University of California at Los Angeles
DePauw University
University of Detroit
Duke University
Fresno State College
Haverford College
University of Illinois
Kalamazoo State Teachers College
Kansas State College
Louisiana State University
Miami University
Mills College
Montana State College
New Jersey College for Women
University of North Carolina
Northeastern University
University of Notre Dame
University of Oregon
Pomona College
Queen's University
University of Redlands
Rice Institute
San Diego State College
Santa Monica Junior College
University of South Dakota
University of Southern California
Syracuse University
Texas College of Mines
Texas Technological College
University of Toronto
University of Utah
University of Vermont
University of Washington
Wells College
Wellesley College

Praise for the book:

"I have explored its pages carefully and can say unhesitatingly that no zoology text of recent years has caught my eye to the extent that it has. I predict for it a very high place among the outstanding American textbooks in zoology."

Professor HALBERT M. HARRIS
Iowa State College

"I have made a careful examination of this book and sincerely believe that it is the best textbook in general zoology that I have ever seen."

Professor H. W. CURRAN
Queen's University

"It is a very fine book, in the production of which both the author and publisher may well be proud of their achievement."

Professor HAROLD KIRBY
University of California

"Professor Storer should be congratulated on his success in setting forth the principles underlying animal biology, and yet including a comprehensive systematic survey of the animal kingdom within the confines of a single volume."

Professor B. P. YOUNG
Cornell University

"The consensus of this Department is that it is without doubt the best text on general zoology that has been published. I predict that this text will become extremely popular."

Professor ROSS E. HUTCHINS
Mississippi State College

"I am very much impressed with the contents of this book. The arrangement is splendid and the great number of concise tables for each group is not excelled."

Professor C. R. JONES
Colorado State College

"Seems to me to be the finest general zoology text yet. The order of treatment of the various aspects of the subject is very effective, the method of treatment excellent, and the illustrations are superb."

Professor THOMAS H. MORTON
Niagara University

"It was a red-letter event when I received Storer's *General Zoology*. Without hesitation I pronounce it by far the best of all the recent zoology texts."

Professor EDMUND JAEGER
Riverside Junior College

Send for a copy on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

MENINGITIS IN TRAINING CAMPS

IT appears from a report in the *Journal* of the American Medical Association by Colonel Henry M. Thomas, Jr., medical consultant, Fourth Service Command, that great progress is being made in the control of meningitis. The World War I death rate for meningitis in the U. S. Army was 39 per cent. This was cut to one fourth (8.8 per cent.) during the early months of last winter's outbreak in the Fourth Service Command, and during the last two months of the outbreak the death rate was again cut to one fourth or 2.1 per cent. in 761 cases, Colonel Thomas reports. "It is safe to prophesy," he states, "that the mortality rate for the remainder of this war will be held to a low level."

Sulfadiazine is the weapon chiefly responsible for the amazingly low death rate. However, the second reduction of the death rate to one fourth its previous figure was not achieved until medical officers and nurses throughout the Fourth Service Command had been trained to recognize the various symptoms, especially in the early stages, and the need for immediate adequate treatment.

Colonel Thomas states that "it seems probable that all members of the medical corps on duty in the zone of the interior during the past few months will continue to be on the watch for cases of meningococcic infection and will be familiar with proper treatment."

Prophylactic treatment with sulfadiazine of meningitis carriers has also been used so successfully in the Army during the past few months that Colonel Thomas feels that it is safe to prophesy that in the coming years the number of cases as well as the death rate of this disease can be greatly reduced.

NEW PLASTER CAST TREATMENT OF BURNS

GOOD results with a new plaster cast treatment for burns of arms, legs, feet and hands are reported by Dr. Stanley M. Levenson and Dr. Charles C. Lund, of Boston City Hospital and Harvard Medical School, in the *Journal* of the American Medical Association.

Possibility that the method may in the future be used for treating burns in the armed forces appears from the fact that the work reported was done under a contract, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and Harvard University. Further suggestion of this appears in the emphasis the doctors put on the wide availability of the materials needed for the treatment, their lack of bulk and the fact that the cast will protect the burned extremity from injury if the patient has to be moved. Healing is as rapid as with other methods of treating burns, and ability to move the burned arm, leg or hand returns more rapidly.

The lack of pain felt by the patients, from the start of treatment to complete healing, is described as "remarkable." As soon as the cast is on, the pain disappears. A slight dull ache was felt for three days by three of eight patients whose cases are reported. A total of 22 patients have had burns treated in this way with "very satisfactory" results.

The casts do more than give the burned part rest and protect it from further injury. They prevent swelling, which other scientists have recently reported as a harmful feature of burns, and prevent slowing of the blood circulation in the burned area. The prevention of swelling also means that less plasma is being lost from the burned area, and in large burns this would lead to considerable saving in the amount of plasma that would have to be given the patient. Applying the cast is relatively easy. The casts used for the burn cases are thinner and lack the bulky padding of casts for broken bones.

ITEMS

INFANTILE paralysis cases throughout the nation decreased from a total of 1,020 the week ending on September 18 to 818 the week ending September 25, according to reports made to the U. S. Public Health Service. Health authorities believe the epidemic is now past its peak. Decreases were reported from all but six states: New Jersey, Wisconsin, Minnesota, Arizona, Utah and Oregon. The only substantial increase was in Minnesota, from 10 to 23. In Illinois, where the epidemic had been particularly fierce, cases dropped from 208 to 140. Texas, one of the first states to feel the epidemic, reported a decrease from 57 to 41. Cases in California, another hard hit state, dropped from 150 to 117.

THE U. S. Department of Agriculture states that approximately 20,000,000 gardens were cultivated this year. About 4,000,000 acres of land were used for them. Some 8,000,000 tons of food were produced. This means that approximately one out of every two families in the country had victory gardens. In the two severe drought areas, the Middle Atlantic states, centered about the District of Columbia, and the Oklahoma-Texas region, many of the gardens were a failure. Throughout the nation as a whole they produced abundantly. In tonnage the production is as great as that of the food for the entire Army. A soldier uses a ton of food a year. The Victory Garden production amounts to about 125 pounds for every man, woman and child in the civilian population.

MONT CENIS tunnel through the Alps connecting Modano, France, with Bardonecchia, Italy, reported to be partly destroyed by Italians to render it useless to the Germans, is sometimes confused with Mont Cenis Pass seventeen miles to the east. Both are of strategic value. The tunnel is used by the railroad from Paris and Lyons in France to Turin and the rest of Italy. It is eight miles long and approximately twenty-six feet wide. It is the earliest of the Alpine tunnels, having been opened in 1871 after fourteen years of effort in its construction. Mont Cenis Pass crosses the mountains at an elevation of nearly 6,900 feet near the junction of the Cottian and Gracian Alps. This is about 1,600 feet higher than Denver, Colo. A carriage road was built through it 140 years ago and a railroad was constructed along the carriage road in 1868. This railway was destroyed in 1871 when the tunnel was put into use. Hannibal, the Carthaginian general, used this pass, it is claimed by some historians, in his invasion of Italy in 218 B.C.

Biology

COLIN

Elements of Genetics

This is a modern, well integrated beginner's text in genetics. It includes at the end of each chapter a list of carefully graded problems. There is a glossary of technical terms and well chosen illustrations. By E. C. Colin, Chicago Teachers College. 47 Illus. 386 Pages, $3.00

NEAL AND RAND

Chordate Anatomy

This book offers material for a sound morphological course with functional interpretations. By H. V. Neal, Tufts College and H. W. Rand, Harvard University. 378 Illus. 467 Pages, $3.50

NEAL AND RAND

Comparative Anatomy

In this book the facts are given interest and meaning in terms of human phylogenesis. Descriptions are clear, and many well labeled figures are included. By H. V. Neal and H. W. Rand. 540 Illus. 739 Pages, $4.75

MARSHALL

Laboratory Guide in Elementary Bacteriology

Designed for a one-semester course, this manual presents 92 experiments grouped under Introductory Technique, Physiology of Bacteria, Applied Bacteriology, Serology and Infection. By M. S. Marshall, Univ. of California. 244 Pages, $1.75

STILES

Handbook of Microscopic Characteristics of Tissues and Organs—2nd Edition

It gives in outline form the main histological characteristics of vertebrate tissues and organs. It is an excellent guide for laboratory study. By K. A. Stiles, Coe College. Illustrated. 204 Pages, $1.50

BREMER

Textbook of Histology—5th Edition

Widely adopted, this book presents a study of histology with emphasis on development and the resulting form. Function is discussed as it helps to explain morphology. By J. L. Bremer, Harvard Med. School. 455 Illus. 580 Pages, $6.50

LAMBERT

Introduction and Guide to the Study of Histology

It provides material for a basic course and builds a substantial foundation for further study in physiology and pathology. By A. E. Lambert, State Univ. of Iowa. 185 Illus. 542 Pages, $5.00

DAVISON

Mammalian Anatomy—6th Edition

The standard text on the anatomy of the cat. By F. A. Stromsten, State Univ. of Iowa. 174 Illus. 328 Pages, $3.00

THE BLAKISTON COMPANY, Philadelphia 5

SCIENCE NEWS

Science Service, Washington, D. C.

A NOVA IN CONSTELLATION AQUILA

A NOVA or new exploding star has been discovered by the German astronomer, Dr. C. Hoffmeister. Located in the constellation of Aquila, the eagle, the nova was of the twelfth magnitude when discovered on September 5. It was found near Altair, the bright star in the constellation of Aquila. Dr. Hoffmeister reports that the outburst occurred between April 13 and May 2 of this year, at which time it attained the seventh magnitude.

Aquila is now visible in the evening sky in the southwest, but the nova is too faint to be seen without a telescope. Even at the time of its greatest brightness, the star was invisible to the naked eye, as only those of the sixth magnitude or brighter can be seen without aid.

Novae are not really new stars at all, but old stars which suddenly increase in brightness. The increase in light from minimum to maximum takes only a few days, but the decline is much slower. The cause of the explosion which creates this flare-up in the star has not been established.

News of the novae was telegraphed to Harvard College by way of Dr. A. Korff, of Berlin, Dr. E. Strömgren, of Copenhagen, and Dr. K. Lundmark, of Lund, Sweden.

Photographs in the Harvard collection indicate, according to Dr. Sergei Gaposchkin, that the nova reached its greatest height about April 28. Since that time it has slowly declined in brightness from between the sixth and seventh magnitude to the twelfth magnitude.

THE HEAD OF COMETS

NITROGEN-HYDROGEN molecules made up of more than two atoms have been found to be numerous in the head of comets. Working at their respective observatories early this year, Dr. Polydore Swings, of McDonald Observatory, Dr. Andrew McKellar, of the Dominion Astrophysical Observatory, and Dr. Rudolph Minkowski, of Mount Wilson Observatory, independently concluded that a molecule composed of one atom of nitrogen and two of hydrogen plays a dominant role in the composition of the head of a comet.

Conducted mainly from measurements of spectrograms of the recent bright comets, Comet Cunningham (1940c) and Comet Whipple II (1942g), this study reported in the September issue of the *Astrophysical Journal* was made at the three observatories. Relatively few photographs of the spectra of comets in the visual region had been made previously.

The spectrum of Comet Whipple II was compared with that of an oxyammonia flame set up in the laboratory at the Dominion Astrophysical Observatory in Victoria, B. C. This flame very closely resembled that of ammonia burning in an atmosphere of oxygen. The prominent features of the two spectra matched well, and it was believed that several of the strongest features in the emission spectra of comets are due to the molecule responsible for at least part of the oxyammonia flame spectrum, this molecule probably being NH_2, a molecule composed of one atom of nitrogen and two of hydrogen.

THE COMPOSITION OF OUR GALAXY SYSTEMS OF STARS

Two systems of stars in various stages of development have mixed in an irregular manner to form our galaxy, according to Dr. A. N. Vyssotsky and Dr. Emma T. R. Williams, of the Leander McCormick Observatory of the University of Virginia. Stars of the main sequence, which constitute the great majority of our stellar universe, conform to one code of motion and distribution, whereas the more massive giant stars follow a very different code of their own.

The apparent galactic concentrations of main-sequence stars can be predicted from those of A-type stars by assuming that there is the same sort of equipartition of energy among these stars as is found among the molecules of our air, according to an article by Drs. Vyssotsky and Williams in the *Astrophysical Journal*. The giant stars, on the other hand, do not follow the same pattern.

Among the stars of the main sequence, the mean kinetic energy of the red dwarfs is about the same as that of the much more massive A-type stars. From this it is assumed that all types of stars of the main sequence have, on the average, the same kinetic energy. Just as in an atmosphere of uniform temperature the heavy molecules tend to remain at lower levels than the light molecules, so among the main sequence stars the massive stars concentrate more toward the central plane of the Milky Way than the lighter stars. The much greater kinetic energies of the giant stars, it is pointed out, agree very well with the relatively small concentration of the giants towards the plane of the Milky Way.

The imperfect way in which the two systems of stars are mixed is seen in the fact that in some parts of the Milky Way there are clouds of main sequence stars and relatively few giants, whereas in other parts of our galaxy the giants appear to be more frequent.

CHEMICAL STERILIZATION OF THE AIR

FIGHTING epidemics of influenza and similar air-borne disease by chemical sterilization of the air seems nearer to practical application as a result of studies reported by Burgess H. Jennings and Dr. Edward Bigg, of Chicago, at the New York wartime conference of the American Public Health Association.

Triethylene glycol vapor can instantaneously kill all the bacteria in the air of a room of 10,000 cubic feet capacity. The ability of this chemical, familiar as a relative of a popular anti-freeze mixture for automobile radiators, to sterilize the air has previously been shown in small experimental chambers. The studies reported show that it can be used in fairly large rooms of about classroom or hospital ward size, or offices in which a number of people work. Whether sterilizing the air in this way will keep infections from spreading has yet to be determined, but experiments so far "leave little doubt that this will be the case."

The triethylene glycol was used in the form of a vapor.

WILEY

WILEY BOOKS
in PSYCHOLOGY
for your V-12 and AST courses

INTRODUCTION TO PSYCHOLOGY

Edited by EDWIN G. BORING, *Professor of Psychology, Harvard University,* HERBERT S. LANGFELD, *Director of the Psychological Laboratory and Stuart Professor of Psychology, Princeton University,* and HARRY P. WELD, *Professor of Psychology, Cornell University.*

"Introduction to Psychology" places stress upon reaction, its motivational determinants, and its role in the personality and in social relations; sensation and perception are treated more generally and with less emphasis upon a detailed scientific discussion. The order of presentation begins with the consideration of conduct, motivation and personality, and concludes with the treatment of perception. The discussion remains at the elementary level.

(1939). **652 pages; 129 illus.; 6 by 9; $3.00**

PSYCHOLOGY—A Factual Textbook

By EDWIN G. BORING, HERBERT S. LANGFELD, HARRY P. WELD, and 16 contributors.

From the standpoint of scientific accuracy and thorough treatment of the subjects covered, this book merits and has received continuous praise since publication. It offers a solid but clear statement of the elementary facts and methods of psychology. Each section has been prepared by a competent authority, and the subject matter has been well integrated, through the efforts of the editors, into an organized, unified whole.

(1935). **555 pages; 131 illus.; 5½ by 8½; $2.75**

PSYCHOLOGY OF PERSONAL ADJUSTMENT

By FRED McKINNEY, *Associate Professor of Psychology and Psychologist in the Student Health Service, University of Missouri.*

Professor McKinney's book is based not only upon teaching experience, but upon clinical experience as well. It is addressed directly to the student. All the major problems in behavior, emotion or personality which confront the student are dealt with. Factual material is provided, derived from clinical records. The principles set forth are psychologically sound.

(1941). **636 pages; 16 illus.; 6 by 9; College Edition, $2.75**

SOCIAL PSYCHOLOGY

By DANIEL KATZ, *Chairman, Department of Psychology, Brooklyn College,* and RICHARD L. SCHANCK, *Professor of Psychology, Ohio Wesleyan University.*

"Social Psychology" is divided into four parts. The first has its interest in the psychology of the average man and in deviations from the average. The second turns to laboratory and research studies of man as affected by his fellow men. Part III returns again to the practical problems of life, but this time to people as distinctive individuals. The concluding section views the social scene from the eyes of the man interested in the larger social relationships.

(1938). **700 pages; 22 illus.; 5½ by 8½; $3.75**

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

This vapor distributed itself readily throughout the room, in a manner similar to water vapor. Fans aided in a more rapid and uniform distribution. Maximum killing effect on the bacteria is obtained with a relative humidity of 35 per cent. to 40 per cent.

One device used to generate the glycol uses the principle of atomization and can be incorporated into the pre-existing duct systems of air conditioning units. Another device generates the vapor by heating a solution of the chemical.

The rate and concentration of the vapor generated must be determined by the number of air exchanges in the room air. For practical use, an instrument must be developed to control operation of the generator, starting and stopping it as the concentration of the glycol in the air changes, something as a thermostat regulates a furnace.—JANE STAFFORD.

BUTTER RATION VALUE

THE expected increase in butter's ration value, which came into effect on October 3, need not cause alarm on the nutrition angle, if margarine is obtainable.

Aside from the flavor it gives to other foods, the chief value of butter is in its fat and vitamin A content. Ounce for ounce, margarine supplies the same amount of fat. The fat in butter comes from cow's milk. The fat in margarine comes from vegetable oils. Corn oil, cotton seed oil and soybean oil are the ones chiefly used to-day, replacing the animal fats and coconut oils of margarines of a generation ago. The margarine fat supplies the same amount of energy and is apparently as easily digested as the butterfat.

Almost all brands of margarine now on the market are enriched or fortified with vitamin A. Federal standards for enriched margarine require it to contain not less than 9,000 U. S. P. units of this vitamin per pound. The amount of vitamin A in butter varies, according to season and the cow's feed. The range may be from 500 to 20,000 units per pound.

Margarine has been declared "nutritionally equal to butter" by the New York Academy of Medicine, which recently issued a statement urging that its consumption be encouraged. Many other medical, health and nutrition authorities agree.

The latest research on the question of nutritional differences between margarine and butter has been done at the University of Wisconsin. As summarized in *Nutrition Reviews*, the results of this research indicated that the kind of starch and sugar in the diet might cause a difference in nourishing quality of butter to show up. They found butter superior to vegetable oils when fed with lactose to young animals.

"More work is necessary," according to the editor of *Nutrition Reviews*, "before it is possible to prove that butterfat possesses marked practical advantages over vitaminized vegetable oils when ingested in the presence of adequate amounts of milk solids or in mixed diets."—JANE STAFFORD.

ITEMS

THE U. S. Public Health Service reports that after twenty years' imprisonment in a test-tube at a temperature of 50 degrees Fahrenheit, the *Bacillus pestis*, agent of the plague, emerged alive and as deadly an enemy as ever. In 1922, this bacillus was isolated from a California ground squirrel and subsequently passed through guinea pigs. From the guinea-pig cultures, one series of tubes was prepared in 1923 in which the "killer" was isolated, and a similar series set up in 1924. Showing no loss of its deadly strength as a result of the two decades of confinement, the plague germ, when released from the 1923 series and injected into guinea pigs, promptly infected them. A series of tubes prepared in 1924 is to be opened at some future date.

DR. MAX D. KOSSORIS, chief of the Industrial Hazards Division of the Bureau of Labor Statistics, at the National Safety Congress in Chicago reported that losses in manpower because of industrial injuries are higher now than they have been for many years. "Considering the trends during the last two years, the further drafting of men out of our industries, and the expected growth in our industrial employment, the trend of injuries can be expected to continue upwards." During the last few years, total work injuries have increased more rapidly than employment. Mr. Kossoris said that from 1940 to 1942 average employment increased by 19 per cent., but work injuries rose 23 per cent.

CONTRARY to expectations, the current war has not brought about an increase in the death rate from accidents, although during the war years of 1917–1918 the accident death rate rose sharply to a very high level, is reported by the Metropolitan Life Insurance Company in its *Statistical Bulletin*. The death rate from accidents among industrial policy holders rose from 67.3 per 100,000 in 1915 to 73.2 in 1916, a year of preparedness for war, and to 76.5 in 1917, the year we entered the war. The increase for the two years represents nearly 14 per cent. "Fear that history would repeat itself was strengthened," the report states, "when in 1941, also a year of active preparation, the rate rose from 46.3 in the previous year to 49.9 per 100,000, an increase of 8 per cent. In 1942, however, the rate actually declined somewhat; moreover, it has shown little tendency to rise so far this year. Even in the expanded chemical and explosives industries, the largest number of lives lost in a single accident since Pearl Harbor was 54, whereas between April, 1917 and November, 1918 there were three accidents in explosives plants, each taking around 100 lives."

FEWER apples and pears fall from their trees before ripe if new sprays and dusts developed by the U. S. Department of Agriculture are used during the growing season. After four years of experimentation with satisfactory results, the procedure is now announced to the public. The first orchard tests were made in June, 1939, on an early summer variety of apple. The result was striking. In only two days two bushels of windfall apples were picked up from under two untreated trees, and only twelve apples from under two treated trees. Later tests gave similar results. It has been now tested on 100,000 acres of orchards. The spray, which is available commercially, is principally alpha-naphthalene-acetic acid. One teaspoon of the chemical is used with 200 gallons of water.

McGraw-Hill Books of Unusual Interest

Manual of Comparative Anatomy

By OSMOND P. BRELAND, University of Texas. *McGraw-Hill Publications in the Zoological Sciences.* 252 pages, 5½ x 8. $2.00

Designed primarily for use in the laboratory in courses that involve the dissection of representative animals. Emphasis is placed upon the comparative aspects of the forms under study, by indicating homologies of structure in the various groups, and by inserting short paragraphs from time to time that compare certain systems of the particular animal under study with the structure of other forms. Specific directions are given for the making of laboratory drawings.

Navigation

By LYMAN M. KELLS, WILLIS F. KERN and JAMES R. BLAND, U. S. Naval Academy. 479 pages, 6 x 9. Textbook edition, $3.75

This text is also available in two separately published volumes:

Part I. **Coastal and Inland Waterways Piloting.** 288 pages, 6 x 9. Textbook edition, $2.50

Part II. **Celestial Navigation and Nautical Astronomy.** 191 pages, 6 x 9. Textbook edition, $2.00

Navigation presents a complete course in the subject, dealing with the best and latest methods used in navigation practice. Unusual simplicity is obtained through logical arrangement of material and careful preparation for each development.

Fundamentals of Optical Engineering

By DONALD H. JACOBS, National Bureau of Standards. 458 pages, 6 x 9. $5.00

A comprehensive introduction to the methods and principles of optical design. The book outlines the fundamentals of optics, gives an analytical description of the functioning and design of representative military optical instruments, states the basic principles of the mechanical design of optical instruments, etc.

Basic Radio Principles

By MAURICE G. SUFFERN, Captain, Signal Corps, U. S. Army. 271 pages, 5½ x 8. Textbook edition, $2.25

Intended especially for the student with a basic knowledge of the principles of electricity. The book covers the fundamentals involved in the science of radio transmission and reception; how radio frequencies are produced and transmitted; how they are intercepted, detected, and amplified; and how they are modified.

A Guide to the Constellations. *New third edition*

By SAMUEL G. BARTON, University of Pennsylvania, and WILLIAM H. BARTON, JR., Curator of the Hayden Planetarium, New York. *McGraw-Hill Astronomical Series.* In press—ready in October

A guide for naked-eye observational astronomy, showing how to locate constellations and principal stars, gives the names of the brighter stars, discusses elementary principles of astronomy, and covers the mythology of the stars. In the new edition changes have been made to bring the material up to date, and new tables and photographs have been added.

An Introduction to Weather and Climate. *New second edition*

By GLENN T. TREWARTHA, University of Wisconsin. *McGraw-Hill Series in Geography.* 535 pages, 6 x 9. $4.00

This leading textbook in its field brings the student the latest research information on climatic regions and climatic types. It describes their characteristics, explains the origin of these various types and regions, and shows how climatic controls acting upon climatic elements produce the different types and varieties of weather and climate.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C. 2

SCIENCE NEWS

Science Service, Washington, D. C.

PHOTOGRAPHIC PLATES SENSITIVE TO VISIBLE AND INVISIBLE LIGHT

DR. C. E. K. MEES, research director of the Eastman Kodak Company, in accepting the Rumford Medals of the American Academy of Arts and Sciences, Boston, in recognition of his photographic researches, stated that photographic plates that capture any kind of light from the ultraviolet to the farthest reaches of the infra-red are now available for scientific use through the use of sensitizing dyes.

He pointed out that a great variety of photographic plates have been made for the spectroscopist and the astronomer who have made discoveries of considerable importance. The eye is sensitive to the visible spectrum. The brightest colors to the eye are yellow, green and red. Photographic materials are in their nature sensitive only to the blue-violet and ultraviolet regions of the spectrum to which the eye has little or no sensitiveness.

Vogel discovered in 1873 that the addition of dyes to photographic materials would make them sensitive for the region of the spectrum absorbed by the dye. This proved to be the foundation of the change in photography affected by the introduction of orthochromatic and panchromatic materials. In 1904 a series of dyes were made in Germany which sensitized plates for those regions of the spectrum which are bright to the eye. The first commercial panchromatic plates were made in England in 1906 by Wratten and Wainwright, Ltd., of which Dr. Mees was then managing director.

The dyes were derived from quinoline, according to Dr. Mees, but their general structure remained unknown until 1920. It became possible to prepare a great variety of these cyanine dyes, as they are called, many of which were superior for photographic use to those which previously had been available.

By the use of them, supersensitive panchromatic materials were made, and these have effected a great advance in photography, especially in motion pictures. The new dyes made possible fine grain panchromatic film of high speed used in miniature cameras. By the use of the cyanine dyes with especially long chains of carbon atoms, photography by infra-red light has been greatly facilitated.

THE PHOSPHORESCENCE MICROSCOPE

A NEW kind of microscope that promises to open up new fields for exploration in biology and mineralogy has been devised by Dr. E. Newton Harvey and Dr. Aurin M. Chase, of Princeton University. It is called the phosphorescence microscope because it makes use of the short-lived phosphorescent glow given off by many substances just after they have been exposed to the action of ultraviolet radiation.

That many things shine in the dark with peculiarly colored visible light when invisible ultraviolet rays strike them is a well-known phenomenon. This light is called fluorescence; and it has been much used in research during recent years. Special fluorescence microscopes have been devised to aid in this work.

When the ultraviolet irradiation stops, fluorescence stops with it. However, it has frequently been noticed that some of the irradiated substances keep on glowing briefly after the ultraviolet lamp has been turned off. This glow, in many cases lasting for only a fraction of a second, has been termed phosphorescence. Among the substances showing this property are human teeth, wool, coral, dried potato and several other materials of both animal and plant origin.

Because of the short duration of this phosphorescence, ordinary microscopic observation has not been possible. Drs. Harvey and Chase, however, thought of the expedient of getting a large number of intermittent flashes, so close together that they appear to merge into one continuous illumination, like the rapidly succeeding "frames" of a motion picture.

Several different means for achieving this end have been devised. In some, the ultraviolet ray source is an intermittent spark, with a rotating shutter shielding the object-lens of the microscope while it is "on" and opening it for the passage of the phosphorescent flash when the spark is "off." Simpler, however, is a continuous source of ultraviolet with a double rotating shutter having staggered openings that alternately admit the ultraviolet rays and open the path for the phosphorescent light to the lens.

A NEW MICROBE EXTRACT

A DEADLY poison, extracted from a microbe that lives in the soil was discovered in the course of researches by Professor Selman A. Waksman and his associates at Rutgers University and the Merck Institute of Therapeutic Research at Rahway, N. J. The object of this research was to find a chemical agent produced by microbes that would be valuable as a germ-killer.

A germ-killing substance was found which was named actinomycin because the microbe that produced it belongs to the genus Actinomyces. It is similar to those microbes whose infections cause certain lung infections, lumpy jaw in cattle, scabbiness in potatoes and a number of other diseases; but this particular species grew in the soil. When Professor Waksman and his co-workers tried actinomycin on various bacterial cultures in glass vessels they found it had very good germ-killing properties. However, when it was tried on laboratory mice and other animals infected with bacteria, it was not so effective against the germs. Worse still, it killed the animals within fifteen or twenty hours.

Actinomycin produces fatal results in mice, rats and other rodents in doses as small as one part by weight to a million parts of the animal's body weight. It is effective both when injected into the animal and when administered in food. The idea of using it for the treatment of human and animal diseases has been given up. It

WILEY

NEW WILEY BOOKS

CHEMICAL PROCESS PRINCIPLES

Volume I. Material and Energy Balances

By O. A. HOUGEN, *Professor of Chemical Engineering,* and K. M. WATSON, *Professor of Chemical Engineering; both at the University of Wisconsin.*

A comprehensive treatment of the application of the combined principles of chemical thermodynamics and kinetics to the problems of the design and operation of chemical processes. Volume I covers stoichiometric principles, behavior of ideal gases, vapor pressure, humidity and saturation, solubility and sorption, material balances, thermophysics, thermochemistry, fuels and combustion, and chemical, metallurgical and petroleum processes. Ready in November.

Approximately 454 pages; 5½ by 8⅜; Probable price, $4.50

SHORT WAVE WIRELESS COMMUNICATION

By A. W. LADNER, *Principal, The Marconi School of Wireless Communication,* and C. R. STONER, *Late of the Research Department, Marconi's Wireless Telegraph Co., Ltd., Lecturer at Queen Mary College.*

A revised edition of a well-known book, containing much new material. Subjects covered include propagation of short waves, modulation, and details of practical equipment used in modern practice. Considerable information has been added on the working of ultra-short waves.

Fourth Edition: 573 pages; 5½ by 8⅜; $6.00

ERUPTIVE ROCKS

By S. JAMES SHAND, *Professor of Geology, Columbia University.*

A study of the petrology of the igneous rocks. The book discusses their origin and physical chemistry, the chemistry of the Earth, the composition of the interior of the Earth, the relation of eruptive rocks to ore deposits; and presents an original system of classification of rocks. A chapter is included on meteorites.

Second Edition: 444 pages; 5½ by 8⅜; $5.00

PHYSICAL BIOCHEMISTRY

By HENRY B. BULL, *Associate Professor of Biochemistry, Northwestern University Medical School.*

This book has developed from a series of thirty-six lectures which the author has given for some years to graduate students in biochemistry, physiology, bacteriology, and neurology. It is designed expressly for those who intend to employ physical chemistry in the interpretation of physical measurements on biochemical and biological systems. The author has used the experimental approach, with many examples of the application of physical chemistry to biological problems.

347 pages; 5½ by 8⅜; $3.75

LABORATORY MANUAL OF EXPLOSIVE CHEMISTRY

By ALLEN L. OLSEN, *Instructor of Chemistry,* and JOHN W. GREENE, *Professor of Chemical Engineering; both at Kansas State College.*

A laboratory manual for explosives courses given to ordnance inspectors, and for courses in the subject for chemistry majors. Gives factual information, laboratory procedures and explanatory notes on explosive chemistry. Important manipulative techniques are described.

106 pages; 5½ by 8⅜; $1.75

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

looks much more promising now as a rat poison, if enough can be produced at reasonable cost.

As a step toward possible eventual synthetic manufacture, it has been prepared as crystals, and a partial chemical analysis has been made. Actinomycin separates into two parts, designated as actinomycin A and B, respectively. The "A" portion contains carbon, hydrogen, nitrogen and oxygen; one provisional formula for the molecule reads $C_{41}H_{56}N_8O_{11}$. It will be necessary, however, to determine the molecular composition more exactly, and to learn the details of its internal structure, before any attempts at synthetic production can be made.

Associated with Professor Waksman in these researches were Dr. Harry J. Robinson, Dr. H. J. Metzger, Dr. H. Boyd Woodruff and Dr. Max Tishler.

TROPICAL GUAVA SHRUBS

GUAVA powder, obtained from the fruits of a neglected tropical shrub, is now being used by British troops as a rich source of vitamin C, and research in the United States indicates that the fruits may become more popular here. Dried guava is so rich in vitamin C that a little over four ounces would protect an Arctic explorer from scurvy for almost three months. In the forthcoming "Handbook of Nutrition," to be published by the American Medical Association, Dr. Russell M. Wilder and Thomas E. Keys, of the Mayo Clinic, point out that, according to research reports from South African laboratories, the powder is reputed to contain a "rather phenomenal quantity of ascorbic acid (vitamin C), 2,500 to 3,000 milligrams per 100 grams."

Investigators, working at the South African Institute for Medical Research and the Government Chemical Laboratories in Johannesburg, found that the vitamin could be preserved best by blanching the unpeeled quartered guavas after the central pulp and stones have been removed. Then the fruit is dried at 130 degrees Fahrenheit for ten to twelve hours and powdered. The product is pleasantly aromatic but has little taste. Vitamin C was found to be at the high level of 2.5 per cent. to 3 per cent., even exceeding such rich sources as dried rose hips, which are reported to contain about 2 per cent. Others have found that the rich vitamin content is lost rather readily in warm climates. Fresh guavas are little affected by stewing, however, and canned guavas proved stable.

Guavas of different varieties grow wild profusely in the tropics and vary widely in their vitamin C content. Natives remove the seeds of the fruits, add sugar and boil the fruit down to a paste. Guava paste and jelly are made in Florida, too, where the fruits grow fairly well. At the California Experiment Station in Riverside, hundreds of guava trees have been bearing fruit, many since 1918. They are a hardy lot, with what Dr. H. J. Webber, of the Experiment Station, calls the habits of a weed. The plants thrive in almost any type of soil from sterile and coarse to rich and loamy, and from very dry to very wet. California experiments reveal that cold is about the only "limiting hazard." A plant for dehydrating guava fruits is now nearing completion in Cuba.

ITEMS

THE general physical fitness of American college men has improved under war conditions if the men studied by the department of physical education at Syracuse University are typical. The average physical fitness score at the university this year shows a 23-point improvement over last year. This year's score of 114.2 is five points higher than the best for any year during which the record has been kept. Out of every hundred men tested this year eighty-eight are as healthy or healthier than the average of those tested last year. The physical fitness rating is essentially an indication of strength. Final averages consist of scores made on tests of arm, leg and back power, hand grip and lung capacity.

Low visibility and slippery roads were the primary causes of the high mileage death rate last winter from automobile accidents on highways. This is the conclusion of Professor Amos E. Neyhart, of Pennsylvania State College, who is administrative head of the Institute of Public Safety. He urges that proper protective steps be taken now as the primary use of cars and trucks to-day is directly or indirectly in war work. The mileage death rate last winter was 24 per cent. greater than the summer toll. This figure applies only to the states in the snow-belt; in the snow-free southern states the winter mileage death rate exceeded the summer rate by only 5 per cent. The remedies suggested include proper headlights, necessary because of shorter days; clean, clear windshields equipped with efficient wipers and defrosters and non-skid tires or tires equipped with non-skid devices. Careful driving at low speeds is also essential.

IRON salts may be used in leather tanning while the scarcity of the standard chromium solutions continues, but the resulting leather will probably show less resistance to aging. This conclusion has been reached in the National Bureau of Standards where Dr. Joseph A. Kanagy and Ruth A. Kronstadt have been studying the possible replacement of chromium salts with those of iron in tanning goat and calf skins. The work is continuing. Ferric sulfate may be used satisfactorily if organic acids are added to the tanning solutions to stabilize them. Lactic, citric, gluconic and hydroxyacetic acids were found suitable. Considerably more iron than chrome is required to tan a piece of leather, the amount being about double.

THANKS to a new electric device, better and speedier results are obtained in the process of electric welding of delicate aluminum and alloy steel plates used in warplane construction. This is a high-voltage "trail blazer" that cuts an electric path through the air which is followed by the low current that does the actual welding, making it certain, reliable and constant. Low currents must be used in arc welding thin metals or the metals will burn. Without this it is difficult to start the electric arc and to keep it glowing while the weld is made. The device, a development of the Westinghouse Electric and Manufacturing Company, is built into the arc-welding machine. In use the operator flicks a switch holding the tip of the rod near the work. The high-voltage current leaps across the gap and the welding current follows. Both currents keep flowing until the weld is finished.

WILEY

NEW WILEY BOOKS

GENERAL CHEMISTRY

By H. G. DEMING, *Professor of Chemistry, University of Nebraska.*

An elementary survey of the subject. It treats the general principles of chemistry somewhat more briefly and simply than does the author's well-known "Fundamental Chemistry," and gives more attention to the applications of chemistry to modern industry. In the fifth edition the book has been completely rewritten to include the recently developed aspects of the science.

Fifth Edition: Approx. 715 pages; 5½ by 8⅜; Probable Price, $3.50

INTERMEDIATE DIFFERENTIAL EQUATIONS

By EARL D. RAINVILLE, *Assistant Professor of Engineering Mathematics, University of Michigan.*

This book is designed for use in a course to follow the usual one in elementary differential equations. Emphasis is placed upon development of the student's technique. The book trains the student in the construction of computable solutions for specific differential equations. Applications to engineering problems are given. An introduction is offered to several topics of importance in the classical theory.

213 pages; 5⅛ by 8⅛; $2.75

SECOND YEAR COLLEGE CHEMISTRY

By WILLIAM H. CHAPIN, *Emeritus Professor of Chemistry,* and L. E. STEINER, *Associate Professor of Chemistry; both at Oberlin College.*

A revised and expanded edition taking into account the new discoveries and the general development of chemistry in recent years, the changing content of the general chemistry courses, and the newer emphases in analytical chemistry and physical chemistry. In the first part of the book, which has been rewritten, the treatment is more quantitative, and more mathematical equations are developed. Adaptable to short or long courses.

Fifth Edition: Approx. 597 pages; 5½ by 8⅜; Probable price, $3.75

STATISTICAL ADJUSTMENT OF DATA

By W. EDWARDS DEMING, *Head Mathematician, Bureau of the Census.*

A practical textbook in statistical adjustment. Different kinds of problems are unified and brought under one general principle and solution—statistical procedures associated with curve fitting and other adjustments by least squares and skeleton table forms for numerical calculations. Suitable for courses in graduate chemistry, physics, sociology, agriculture, or biology.

Approx. 248 pages; 5½ by 8; Probable price, $3.50

INDUSTRIAL CHEMISTRY

By W. T. READ, *Dean of the School of Chemistry, Rutgers University.*

A well-balanced picture of modern industries from the standpoint of chemical compounds and changes, chemical engineering operations, sources of raw materials, uses of products, and economic relationships. Thoroughly revised and modernized, this long-time favorite should be even more useful.

Third Edition: Approx. 615 pages; 5½ by 8⅜; Probable price, $5.00

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

SCIENCE NEWS

Science Service, Washington, D. C.

CRIMEA

THE narrow strip of land connecting Crimea with the Russian mainland, the Perekop Isthmus, is some five miles wide. It separates Karkinit Bay on the west from Sivash, or Putrid, Sea on the east. The Sivash is really a great lagoon. It is separated from the Azov by a long neck or spit of sand called the Tongue of Arabat, which stretches along the entire eastern Crimean shore.

The Sivash Sea or lagoon is crossed by the only railroad from the mainland to the Crimean peninsula. This road extends southwesterly across Crimea to Sevastopol on the southwest coast of the Black Sea. A branch road cuts it at right angles on its way from Armyansk in the northwest, near the isthmus, to Feodosiya, or Theodosia, on the southeast coast. This line extends on to Kersk on the Kersk Strait, the narrow waterway between the Azov and the Black Sea.

Most of Crimea, which has an area of about 10,000 square miles, being approximately equal in area to Maryland, is a high dry prairie country except along the southeast coast. Paralleling this coast for a distance of about seventy miles are three mountain ranges, the highest being nearest the shore. This range is from 2,000 to 2,500 feet in height and has three peaks about 5,000 feet high.

The "Russian Riviera" lies along the coast between these mountains and the Black Sea. It contains many summer sea-bathing resorts. The eight-mile wide strip between the mountains and the sea holds the remains of many historical objects, including ancient Greek temples and fortresses.

Sevastopol, exclusively a naval arsenal since 1890 until taken by the Germans, has an excellent natural harbor and roadstead with water from 36 to 240 feet deep. It could accommodate the combined pre-war fleets of all Europe. During these years foreign vessels did not use the port unless delivering military equipment or supplies to Russia. Commercial trade was diverted to Feodosiya, or if from Mainland Russia, to the port of Nikolaev on the bay at the mouth of the Dneiper River.

The pre-war population of Crimea was 1,126,000. Grazing, mining and agriculture are the principal civilian occupations. The lack of rainfall on the prairies prevents extensive land cultivation. Snows seldom visit Crimea except in the southeast mountain region. Potable water is a problem for a great army; it is obtained only by drilling deep wells.

PROTECTION FROM EYE FLASH

A PRACTICAL method for giving 100,000 or more welders in the Nation's shipyards greater protection from "eye flash" was described by Dr. Philip Drinker, of Harvard School of Public Health and the U. S. Maritime Commission, at a conference on industrial medicine held at Boston by the American Mutual Liability Insurance Company. The method was worked out in cooperation with Dr. V. Everett Kinsey and Dr. David G. Cogan, of Harvard Medical School, details are reported in the *Journal* of the American Medical Association.

The probable danger to the eyes in any given welding situation can be determined by measuring the intensity of light from the welding arc with a light meter calibrated in foot candles. The measurements must be made at night to avoid interference by sunlight. The light meter does not measure the ultraviolet light from the welding arc, which is what does the damage to the eyes. In special experiments with a tantalum photoelectric cell and click meter, however, it was found that the light meter readings paralleled the ultraviolet radiation and so could be used as a guide in determining exposure to dangerous amounts of ultraviolet.

Part of the experiments were made with laboratory animals and part with human volunteers who held their eyes open seven feet from a welding arc for periods of 20 and 30 seconds. From these tests, it is estimated that about 150 foot-candle minutes would represent the average exposure coefficient necessary to produce minimal eye injury in half those exposed to the radiation.

A person working near where welding was being performed might, for example, accumulate through repeated exposures during the day a total of 15 minutes of exposure. He would be in danger of eye trouble if the intensity at the distance he was from the arc was 10 foot candles or more.

A minimum standard of safety for those in the neighborhood of electric welding arcs would be one tenth the time and intensity of radiation required to produce minimal effects on the eyes. Since it would be difficult in actual working conditions to determine the probable time a person might be exposed, it would be safer to provide protection in the form of shields or goggles unless a safety factor of about tenfold could be allowed.

Actually, the idea of "flash" exposures is not in line with the time of exposure found necessary to produce symptoms. There is apparently little need to provide protection for persons who will only be exposed to the welding arc momentarily.

Any spectacle or goggle having a thickness of two millimeters or more, whether colored or not, they point out, will provide practically complete protection from electric arc welding if there are shields at the sides.

SYNTHETIC SAPPHIRE FOR WAR PRECISION INSTRUMENTS

SYNTHETIC sapphires for bearings in precision instruments essential in the war effort are now being produced commercially in sufficient quantities to meet the principal demands. This commercial production in America is a war development made necessary by the halting of the importation of European products.

Sapphire and ruby are both varieties of the mineral corundum, which is aluminum oxide. They are made by fusing extremely finely powdered aluminum oxide in an oxy-hydrogen flame in a special furnace. The product, unless coloring is added, is colorless.

Sapphire and ruby differ only in color. The coloring is obtained by mixing certain metallic oxides to the

BLAKISTON

Morris' Human Anatomy 10th Ed.

● This famous text presents a complete study of the human body written by eminent anatomists. It has been thoroughly revised and brought in line with current thought. Reference is made throughout the text to clinical aspects and relations of parts and systems under discussion. Most of the illustrations have been remade and improved by a new technique. By 13 Contributors, Edited by J. Parsons Schaeffer, Jefferson Medical College, Philadelphia. **1155 Illus. Mostly in Colors. 1641 Pages. $12.00** (1942)

Krieg's Functional Neuroanatomy

● Presenting the subject from a new approach, this book includes in one account the anatomy, connections and physiology of the human central nervous system. The entire text is arranged in functional lines. A notable feature of the work is the large, double-page illustrations completely interpreted by three-dimensional reconstructions. By W. J. S. Krieg, New York University School of Medicine. **274 Illus. 553 Pages. $6.50** (1942)

Stiles' Handbook of Microscopic Characteristics of Tissues and Organs. 2nd Ed.

● This book provides genuine help for the student in identification studies. The material is arranged in systems and each system is followed by a tabular summary. Discussions are subdivided into general characteristics, unique attributes, types, origin from fundamental layers of the embryo and examples of locations in the body. By K. A. Stiles, Coe College. **204 Pages. $1.50** (1943)

Gould's Medical Dictionary. 5th Ed.

● Gould's famous dictionary offers the maximum in utility for all who require a complete, authoritative reference work to medicine and the allied sciences. The book is frequently reprinted to incorporate new words or definitions. This edition contains many useful tables, a new grouping of illustrations in color, and a key to the pronunciation at the bottom of each page. Revised by C. V. Brownlow and Staff. **Rigid or Flexible Covers, Plain $7.00. Thumb Index $7.50** (1941)

Hawk and Bergeim's Practical Physiological Chemistry. 11th Ed.

● This book is a standard laboratory and classroom text in biochemistry. It presents the best methods in a concise, informative manner. Written by P. B. Hawk, Food Research Laboratories, New York and O. Bergeim, University of Illinois. In Collaboration with B. L. Oser and A. G. Cole. **281 Illus. 7 Color Plates. 968 Pages. $8.00** (1937)

THE BLAKISTON COMPANY, Philadelphia 5, Pa.

corundum powder before it is fused. Colorless sapphire is used usually for bearings. Coloring is added as a rule only when they are wanted for jewelry or for bearings in watches. The value of the sapphire for bearings is its hardness. It ranks next to diamond. The average sapphire boule weighs about 200 carats. The term "rod corundum" is applied to synthetic sapphires of a long crystal form.

Spinel, another synthetic mineral, a red variety of which is called spinel ruby, is made from magnesium aluminum oxide. It is not as hard as sapphire but is harder than glass or steel. It also is used for bearings but is not yet being produced in commercial quantities.

Colorless sapphire was first formed in England about 40 years ago by means of what is called the Verneuil inverted blowpipe method. Before then synthetic sapphire was opaque. Verneuil dropped finely powdered aluminum oxide through the flame of an oxy-hydrogen inverted blowpipe. The powder melted in the flame and small droplets fell on a fire-clay rod placed below. Several crystals formed, but soon one began to grow at the expense of the others. As more powdered corundum was added this larger crystal became an inverted, clear, pear-shaped mass or boule. Commercial methods were developed later from Verneuil's earlier work.

THE SPREAD OF INFANTILE PARALYSIS

DR. HOWARD A. HOWE, of the Johns Hopkins School of Hygiene and Public Health, speaking before the Federation of Sewage Works Associations meeting in Chicago in a wartime conference on sanitation, stated that the mystery of how infantile paralysis spreads has not yet been solved, although sewage, flies and mucous droplets on human breath are all more or less under suspicion. He summed up the views on the subject of both himself and his associate at the Hopkins Poliomyelitis Research Center, Dr. Kenneth F. Maxcy, who is now out of the country.

The case for spread *via* sewage rests on two facts: 1. The virus of the disease has repeatedly been found in intestinal wastes from patients and healthy carriers; 2. The virus has on several occasions been found in city sewage when cases of the disease were at a maximum.

Attempts to determine whether chlorination of water is effective in destroying the virus in water supplies that might become contaminated have been inconclusive, because the experiments have not duplicated actual conditions closely enough.

The chief reason why epidemiologists do not believe that infantile paralysis is spread by contaminated water is that the epidemics do not behave like epidemics of other water-borne diseases such as typhoid fever. The disease has never been correlated with poor water supplies, nor have explosive outbreaks of widely scattered cases occurred in cities with municipal water systems. This would be expected if the virus were spread through the water mains.

Flies can carry the virus of infantile paralysis, but it seems unlikely that they play much part in spreading the disease. They are not, for one thing, invariably associated with the disease. The disease, moreover, chiefly attacks children, which would not be the case if it were spread primarily by flies or other insects.

The virus is also found in the walls and secretions of the pharynx, in the throat, which suggests the possibility that it may be spread from one person to another by droplets of mucus from the pharynx.

ITEMS

COMET Comas-Sola, last seen in 1935, has been rediscovered. Miss L. Oterma, of Finland, on October 2 located it in the constellation of Cetus, near where it had been predicted that the comet would reappear. Harvard College Observatory received this report in radio message relayed through Sweden. Comet Diamaca, discovered in September by the Roumanian astronomer after whom it it named, is getting fainter. When first seen on September 9, the comet was of the eighth magnitude. However, when it was located a week or two later by Leslie C. Peltier, amateur astronomer of Delphos, Ohio, it had already become considerably fainter, being then of the tenth magnitude. It is expected to decrease in brightness until it is no longer visible. Comet Diamaca has been found to follow a parabolic path, being nearest the sun on August 21. The elements of the orbit were computed in Europe.

WHEN the air is full of smoke, much more infra-red radiation reaches us than visible or ultraviolet. In fact, infra-red rays penetrate a smoky atmosphere much better than formerly realized, it appears from a report made by Irving F. Hand, of the Blue Hill Observatory, to the American Meteorological Society. Calculations were made of the relative amounts of radiation that should be received of sunlight and light composed of only the longer wavelengths. These checked closely in the case of a smoke-free atmosphere, but differed noticeably when there was smoke. "The range between the maximum and minimum values of total radiation during a ten-minute period in the presence of smoke was 2.3 times as great as the range between the maximum and minimum values of infra-red radiation." Local forest fires which raged 20 miles or so west of the observatory furnished an excellent opportunity to study the change in radiation reaching the earth. Simultaneous measurements were made immediately before and during the passage of the smoke cloud.

ADJUSTED soap formulas have been prescribed by the War Food Administration to increase the nation's soap supply by approximately 9 per cent. without using additional fats and oils. A few users of soap may feel that the increased use of rosin and other domestic non-fats as a substitute for such common soap-making materials as palm and coconut oils does tend to make the soap a shade darker. The soap may not lather quite as well as the same brand did formerly and be harder on the hands, but the change will be so slight as to be scarcely noticeable. The percentage of substitution of rosin and other materials will depend on the type of soap. Some soap chips and granules will contain an extra 15 per cent. of rosin and builders, whereas toilet bars are required to increase their use of rosin only 2 per cent. Rosin, the residue from the distillation of crude oil of turpentine, has long been an important ingredient of yellow household and washing soaps because of its great cleansing quality.

PHYSICS

HECTOR, LEIN and SCOUTEN—
Electronic Physics

289 Illus.
355 Pages
$3.75

A new text in which the fundamentals of electricity and light are presented by means of modern electronic concepts. The electrical nature of atoms of all elements is constantly used in the explanations of the subject. Color is used in nearly every illustration.

Teachers say: "The text is clearly written, with due emphasis on essentials and on practical applications. It will help our schools produce men with a practical working knowledge of the subject."

By L. Grant Hector, National Union Radio Corporation; Herbert S. Lein, and Clifford E. Scouten, University of Buffalo.

DUFF—Physics 8th Edition

630 Illus.
715 Pages
$4.00

A standard text for students of science and engineering, written by collaboration of eminent physics teachers.

Teachers say: "I like its method of approach, style and development, and its appeal to young engineering students and those interested in science."

By A. Wilmer Duff, Worcester Polytechnic Institute, and Collaborators.

FOLEY—College Physics 3rd Edition

470 Illus.
757 Pages
$3.75

A widely adopted text for use by students in the arts and sciences. It is also giving excellent results in accelerated programs.

Teachers say: "This text is well organized. The selection of material is excellent. The new illustrations are interesting and the problems thought-provoking."

By Arthur L. Foley, Indiana University.

STRANATHAN—The "Particles" of Modern Physics

218 Illus.
571 Pages
$4.00

A thorough, well balanced study of modern physics designed for use by college students. The experimental evidence for each concept is carefully stressed. An excellent bibliography and many useful tables are included.

Teachers say: "It is the best introduction to atomic physics that a student could have. It will give students a good working knowledge of essential, fundamental concepts of modern physics."

By J. D. Stranathan, University of Kansas.

THE BLAKISTON COMPANY
PHILADELPHIA 5, PA.

SCIENCE NEWS

Science Service, Washington, D. C.

COMET LOST FOR PAST TWENTY YEARS FOUND AGAIN

A COMET lost for the past twenty years has been found by Dr. George Van Biesbroeck, of the Yerkes Observatory, observing at McDonald Observatory in southwestern Texas. It is comet d'Arrest, not seen since 1923, which inadvertently helped the amateur astronomer, Leslie C. Peltier, of Delphos, Ohio, to find the comet Diamaca last month. Dr. Van Biesbroeck himself had asked Mr. Peltier to look for comet d'Arrest, and it was just after giving this up as a hopeless task that Mr. Peltier picked up the comet.

In a wire to Harvard College Observatory, Dr. Van Biesbroeck gives the magnitude of the new comet as the twelfth, making it too faint to be visible without telescopic aid, hence of interest only to professional astronomers.

Its position, right ascension 20 hours, declination minus 28 degrees, places it so far south of the celestial equator that Mr. Peltier's inability to find it is not surprising. From McDonald Observatory, however, the comet appears at present much higher in the southern sky, a fact which must have facilitated Dr. Van Biesbroeck's re-discovery.

Inasmuch as the orbit of comet d'Arrest had long since been predicted, astronomers knew fairly well where to look for it, but it appears to have passed close to the sun about two days ahead of schedule.

At the request of Dr. Van Biesbroeck, Mr. Peltier had spent several evenings in search for comet d'Arrest, lost since 1923. When his search appeared fruitless, Mr. Peltier resumed his regular program of comet seeking on the night of September 18, with fortunate results. Half an hour after he stopped looking for comet d'Arrest he observed a faint, ill-defined object in the constellation of Draco. Five minutes of watching through his telescope clearly showed the motion of this comet, a new one for Mr. Peltier, although it had been discovered by Diamaca, a Rumanian, some nine days earlier. However, Mr. Peltier's find was extremely important, as he was the first American to see the comet since news of its discovery had been received at the Harvard Observatory several days earlier. It is possible that he made the only observations of the comet from the Western Hemisphere, for he reports that by September 22 its magnitude had dropped from tenth to thirteenth, making it very difficult to locate.

Mr. Peltier states that the Diamaca comet was somewhat brighter at the center but without any suggestion of nucleus or tail. His observations confirmed the path of the comet as indicated by the original discoverer, although its motion was exceedingly rapid. This, and the rapid fading of its light, explain why the comet proved so elusive. However, European astronomers observed it well enough for an orbit to be computed. From this it appears that the comet is already on its way out into the depths of space, having passed nearest to the sun on August 21.—CHARLES A. FEDERER, JR.

THE COAL SHORTAGE

RESERVE coal stock piles are reported low in various sections, and low temperatures may result in many homes this winter unless increased production and shipments meet the daily needs. Even the quota allowed to retailers by government officials, 90 per cent. of last year's supply, may not be available in certain communities.

The reason is a coal shortage which will probably grow worse as the activities incident to war continue to expand, unless production can be increased. For a substantial period the production has fallen below the level of national requirements.

The best proof of this statement rests in the fact that in the period from January 1 to September 1 of this year, consumers' stock piles of bituminous coal were reduced from 85,889,000 tons to 75,292,000 tons. Production in that period lacked 10,597,000 tons of equalling requirements, and the difference had to be made up from reserves. That is only half the story. During the same period last year stock piles were increased by nearly 20,000,000 tons as protection against future requirements. This year, instead of building up reserves, production did not meet current needs and consumers were forced to burn stock piles intended for future use.

In September, 1942, it was estimated by the Federal Solid Fuels Administrator that 600,000,000 tons would be needed for 1943. Consumption so far shows this estimate to be close to the mark. Production as of October 1 was a little less than 445,000,000 tons. Even without strikes it would be a practical impossibility to reach the 600,000,000 goal now.

The anthracite situation is even worse than the bituminous coal situation. It was estimated at the beginning of the year that 65,000,000 tons would have to be mined to meet all requirements. This is an increase of 10 per cent. over production the previous year. Actual increased production to date is less than 1 per cent.

Anthracite is the number one household fuel in the North Middle Atlantic States, and large quantities are used in New England, although fuel oil was the most used fuel there in normal times. New England now is reported to be in a bad situation, with many communities whose local stock piles are exhausted.

The price factor does not enter into the present coal situation to any considerable extent. Ceiling prices established by the Office of Price Administration permitted an increase of about 25 cents a ton for bituminous coal and 50 cents for anthracite to meet mining adjustments. Otherwise there is little change from the prices of last year.

REMEDIES FOR UNPLEASANT NOISES

IF noise gets on your nerves, a few things that you can do about it are suggested in a report by Dr. Carey P. McCord and John D. Goodell, of Detroit, which appeared in the *Journal* of the American Medical Association.

McGRAW-HILL BOOKS OF TIMELY IMPORTANCE

Just Published

QUANTITATIVE ANALYSIS. *New second edition*

By HAROLD S. BOOTH and VIVIAN R. DAMERELL, Western Reserve University. *International Chemical Series.* 297 pages, 6 x 9. $2.50

As before, this combination textbook and laboratory manual in elementary quantitative analysis includes detailed directions for calibration of weights and volumetric apparatus, and for numerous gravimetric and volumetric analyses, together with extensive theoretical discussion of many points in connection with the laboratory work. In the new edition gravimetric and volumetric problems have been added, and seven new determinations have been included.

Recommended for the Navy V-12 Course in Engineering Materials (C6)

CHEMISTRY OF ENGINEERING MATERIALS. *New fourth edition*

By the late ROBERT B. LEIGHOU, Carnegie Institute of Technology. Revised by Members of the Chemistry Faculty of the Carnegie Institute of Technology; J. C. WARNER, Editor. *International Chemical Series.* 645 pages, 6 x 9. $4.50

The primary purpose of this widely used book is to provide information on the chemical properties of engineering materials, so that these materials may be more intelligently selected and used. The new edition contains detailed discussions of synthetic rubbers, synthetic resins as constituents of organic protective coatings, heat insulators, high-octane motor fuels, and high-pressure lubricants. New chapters have been added to cover metallic and inorganic protective coatings, the technology of shaping metals and alloys, abrasives, glass, and organic plastics.

QUANTITATIVE CHEMICAL METHODS FOR ENGINEERING STUDENTS

By OTTO M. SMITH and L. F. SHEERAR, Oklahoma Agricultural and Mechanical College. In press—ready in January

This forthcoming manual, designed for use with the above text, meets the need of engineering students for more extensive knowledge of the practical application of chemistry in its quantitative engineering aspects than is usually given in the general chemistry course or in a third semester which is sometimes devoted to qualitative or quantitative analysis. The manual aims to teach techniques in the use of the chemist's tools such as the analytical balance, volumetric equipment, and standard solutions, and to show the engineer how to analyze those materials that he will use in his professional work.

ENGINEERING MATERIALS

By ALFRED H. WHITE, University of Michigan. 547 pages, 6 x 9. $4.50

Approaching the subject from the modern theoretical viewpoint, this leading textbook discusses plastics, protective coatings, corrosion, fuels, combustion, water softening, and the newer alloys, as well as the older types of ferrous and nonferrous metals, clay products, cement, and concrete. The treatment stresses the relationship of properties of materials to their atomic and crystalline structure. No knowledge of chemistry, however, is assumed beyond that usually given to engineering students in their freshman year.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C. 2

If the loud ticks of a watch on a tabletop keep you awake, hang it up and you may be unable to hear it. The principle involved is that the tabletop acts as a sounding board and amplifies the noise of the watch.

The public needs to be convinced that noise is unnecessary. Many law-abiding citizens, who would not contemplate the sending up of a rocket flare on a public street, or turning a flood light on an apartment house to attract the attention of a friend, will unhesitatingly blanket a house or an entire block with resounding noise from a badly designed automobile horn. Automobiles should have horns that do not frighten people with shrieking noise, the report suggests. Just as it is possible to train a dog to wag his tail when he hears a pleasant word, so human beings could be educated to respond to a simple non-irritating sound as a danger warning. Use of a mellow horn on modern diesel locomotives instead of the shrill steam whistle of past years was cited as such an advance.

Sound reduction and air conditioning are closely allied as in the modern air-conditioned trains and buildings. By eliminating the necessity for open windows for ventilation, it is possible to exclude almost all exterior noise. Relatively quiet operations or devices may be substituted for those causing noise in some cases. Examples are: Use of welding instead of riveting in building, use of light signals instead of telephone bells and other noisy devices intended to attract attention. Installation of acoustic material on the walls or elsewhere, such as the increased use of carpets, wall hangings and drapes, is also useful in noise control.

These and further measures were suggested in the report of the Committee of the American Medical Association's Study of Air Conditioning for the purpose of showing that much current noise is needless; that effort against noise is a widely neglected but legitimate portion of over-all warfare; that methods of noise control are practical and no longer technically mysterious; and behind some of the more publicized evils of the day, such as wilful absenteeism, may be found the insidious disturbances from noise.

TOOTH DECAY

EVIDENCE that one dream for the post-war world, freedom from tooth decay, is very likely to come true through use of fluorides in drinking water has appeared in reports by Dr. H. Trendley Dean, of the U. S. Public Health Service, and Raymond J. Faust, assistant engineer of the Michigan State Department of Public Health.

"Carefully made epidemiological studies by the U. S. Public Health Service," Dr. Dean reported to the New York meeting of the American Public Health Association, "show that school children using domestic waters containing as little as one part per million of fluoride experience only half to a third as much dental decay as comparable groups using a water that contains no fluoride. Lake Michigan, the Ohio, Mississippi and Potomac rivers are illustrations of fluoride-free waters, but of course there are many more. Far-reaching mass control of dental decay in large population groups begins to loom up as a distinct possibility."

The amount of fluorine necessary to stop dental decay is not enough to cause the disfiguring mottled enamel that is found among users of water with higher fluorine concentrations. In fact, it is no more and in some cases less than the amount in water supplies now used daily by more than a million people in the United States.

Dr. Dean added one word of caution: Communities should not be hasty about adding fluorine to their water supply until careful studies show the safety of this measure in relation to other aspects of community health.

On the practical side, adding fluorine to public water supplies should not prove difficult or expensive, according to Mr. Faust. It could be done with chemical feeding equipment of the type already in use and familiar to water plant operators. The cost per person per year would be about seven and one-half cents. For a family of four the cost per year would be about 30 cents. A simple, accurate color test must be developed, so that water plant operators with little technical education could routinely check the water to make sure the right amount of fluorine was being fed into it.—JANE STAFFORD.

ITEMS

THE daily weather map, with its old familiar isobars and isotherms, plus the newer symbols indicating the location and nature of air masses, will be available again, according to a report of the U. S. Weather Bureau in response to a Science Service query. Security questions are now being cleared up with Army and Navy authorities. It is felt that with recent easing in the U-boat situation, weather information can be distributed in this way, as well as through press and radio, without giving out information useful to the enemy. It might become necessary to renew the restrictions, but at present this does not appear to be too serious a prospect.

THE sun can actually appear rose-colored instead of golden, and this isn't just a trick of the imagination. When a large cloud of nearly transparent dissipating smoke comes between the sun and observer, it may take on a rosy tint, according to an article by Dr. C. C. Wylie, of the University of Iowa, printed in *Popular Astronomy*. Through dust, the sun's image appears colorless or yellowish, and through haze it may even appear bluish. When projecting an image of the sun on a piece of white cardboard with a 5¼-inch refracting telescope, Dr. Wylie and a group of students were surprised to see the entire image of the sun turn to a distinct rose color, the entire disk being uniformly colored.

WILD guayule shrubs are being gathered in southwest Texas by the U. S. Forest Service to contribute to the natural rubber supply needed by the armed services. The quantity which can be collected is small, but it will help. The shrubs will be processed in the government guayule plant in California. The general area from which the guayule is now being gathered once produced a commercial rubber which was processed in a guayule mill at Marathon. It closed in 1926. Some 2,000 tons of shrubs, it is estimated, may be secured now in rough country surrounding the area harvested for this mill.

JUST PUBLISHED

a new book of immediate importance

NAVIGATION

By LYMAN M. KELLS, WILLIS F. KERN and JAMES R. BLAND
Department of Mathematics, United States Naval Academy

479 pages, 6 x 9, 392 illustrations. Textbook edition, $3.75

A complete course on the subject, dealing with the best and latest methods used in navigation. Unusual simplicity is obtained by logical arrangement of material and careful preparation for each development. The book outlines the mathematical background for each theory of navigation, and treats each one thoroughly by means of clear exposition, illustrative examples, and graded exercises.

This text is also available in two separately published volumes:

Part I. Coastal and Inland Waterways Piloting. 288 pages, 6 x 9, 265 illustrations. Textbook edition, $2.50

Each important topic is first treated in detail so that the facts and processes connected with it are well understood. Then follows a set of exercises, calling attention to the most important ideas, and causing the student to think about the situation, reason about it, and become familiar with its various ramifications. Next, easy numerical problems are presented, followed by important problems of greater difficulty, corresponding to those encountered in the actual practice of piloting.

Part II. Celestial Navigation and Nautical Astronomy. 191 pages, 6 x 9, 127 illustrations. Textbook edition, $2.00

Navigational theories are thoroughly treated in systematic, independent discussions, with a wealth of exercises graded according to difficulty. The book considers the four important methods of solving a special triangle of which two sides and the included angle are known. Some of the most recent material deals with the Hagner Planetarium and the Rude Star Finder for locating heavenly bodies and understanding their motions, and with the Sonic Depth Finder for locating position and making landfalls even in darkness and fog.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, WC.2.**

SCIENCE NEWS

Science Service, Washington, D. C.

SOME PAPERS READ BEFORE THE CINCINNATI MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY

Reported by CHARLES FEDERER, Harvard College Observatory

ORION'S TRAPEZIUM STARS MAY SHOW RELATIVITY SHIFT

EVERY amateur astronomer who possesses even the smallest of telescopes has turned it to the great nebula in the sword of Orion and discovered the four brilliant, blue stars buried in the nebulosity which form the Trapezium.

Dr. Otto Struve, director of Yerkes and McDonald Observatories, reported to the Cincinnati meeting of the American Astronomical Society the results on his spectrographic study of these four stars. Dr. Struve and Dr. John Titus, a Yerkes astronomer, jointly observed the Trapezium stars in March and April of this year, but they found the spectra of the stars difficult to measure because the bright, emission lines of the nebula itself were superimposed over the stellar spectrum in each case. They were, however, able to determine that the lines of the Trapezium stars were displaced toward the red end of their spectra more than the emission lines from the Orion nebula.

The usual interpretation of the shift of lines in a spectrum, other factors being accounted for, is that the star is approaching us if the lines are shifted toward the violet and receding from us if the shift is to the red. The average velocity of recession for the nebula is about 10 miles a second, but the Trapezium stars show red shifts indicating that they are going away from us nearly twice this fast. They have always been thought to have been closely associated with the nebula, so it is surprising to find that they are apparently moving as a group through it, and will some day be out of its vicinity.

An alternative explanation was suggested by Dr. Struve, however, for he called attention to the probable large masses of these stars. As they are blue stars with very hot surfaces, they can be ordinary stars and still shine as brightly as red giant stars many times their size. This combination of large mass and small size is just what is required to produce an observable Einstein or relativity shift in the spectrum of a star. The large mass produces a strong gravitational field, particularly strong in a small star because its surface is close to its center. Light escaping from such a field loses some of its energy on the way out and appears redder than normal.

It was in the white dwarf stars, such as the companion of Sirius, which has a density 50,000 times that of water, that the relativity shift predicted by Einstein was first actually observed, helping to prove his theory. Dr. Struve's extension of observations to more ordinary stars such as those in the Trapezium represents a triumph of observational astronomy. This is, however, only proposed by Dr. Struve as a substitute to considering that the four stars are moving through the nebula, and that it is not known now which alternative is the true one.

CEPHEID VARIABLES

PULSATING stars known as Cepheid variables are among the best timekeepers in the world. Particularly regular in their pulsations are the short-period or cluster-type Cepheids, which go through a complete expansion and contraction in about half a day. Their changes in size are observed by us as variations in the positions of the lines in their spectra, which are also accompanied by fluctuations in the brightnesses of these stars.

So regular are such stars, for instance, the one known as AR Herculis, a tenth-magnitude star in the constellation of Hercules, that Everett C. Yowell, of Columbia University, has been able to determine its period as 11 hours, 16 minutes and 51 seconds. This information he derived from examining Harvard plates of the region of the sky containing this star and extending from 1899 to 1925. But on plates from the latter time to 1941, the period of the star is found to be 11 hours, 16 minutes, and 49.6 seconds, or 1.4 seconds shorter than formerly.

Together with a change in the rate of its primary fluctuations, this celestial timepiece has revised its "secondary" period as well, as Mr. Yowell finds that this, too, has changed, increasing by about three seconds in 1925.

What happens inside such a star to make it so suddenly start beating a new rhythm is not known, but it must be explained by some real physical change. Meanwhile, astronomers are searching for other stars whose periods have changed unexpectedly.

DIMINISHING RETURNS OF ASTRONOMY

THE law of diminishing returns, so well known by its applications to agriculture and economics, applies to astronomy too, according to Dr. Joel Stebbins, director of Washburn Observatory of the University of Wisconsin.

In his address as retiring president, Dr. Stebbins said that many methods of astronomical observation and research had reached the limit of their practicability, and were fast being replaced by simpler and more effective approaches to the job of finding out what makes stars "tick."

As telescopes are made larger and larger, there is much less than a proportionate increase in power, and even this is offset by such factors as the enormous size required for mountings and observatories to house the instruments. With the famous 40-inch Yerkes refractor, the practical limit of size for telescopes employing a lens to focus the light has been reached, and that telescope is already nearly 50 years old. The 200-inch telescope, now nearly completed on Mount Palomar in California, will undoubtedly be the largest telescope of any kind for a long time

WILEY

NEW WILEY BOOKS

THE ORGANIC CHEMISTRY OF SULFUR

Tetracovalent Sulfur Compounds

By CHESTER M. SUTER, *Director of Chemical Research, Winthrop Chemical Company, Inc.*

A comprehensive and thorough treatment of the subject. The practical value of compounds is considered, as well as their chemical properties. Methods of preparation are given, and general properties, common reactions and derivatives. The material is well organized, clearly presented. No other book covers the subject in comparable fashion. *Ready in November.*

Approx. 758 pages; 5½ by 8⅛; Probable price, $7.50

STATISTICAL ADJUSTMENT OF DATA

By W. EDWARDS DEMING, *Head Mathematician, Bureau of the Census.*

A practical textbook in statistical adjustment. Different kinds of problems are unified and brought under one general principle and solution—statistical procedures associated with curve fitting and other adjustments by least squares and skeleton table forms for numerical calculations. Suitable for courses in graduate chemistry, physics, sociology, agriculture, or biology. *Ready in November.*

Approx. 248 pages; 5½ by 8; Probable price, $3.50

GENERAL CHEMISTRY

By H. G. DEMING, *Professor of Chemistry, University of Nebraska.*

An elementary survey of the subject. It treats the general principles of chemistry somewhat more briefly and simply than does the author's well-known "Fundamental Chemistry," and gives more attention to the applications of chemistry to modern industry. In the fifth edition the book has been completely rewritten to include the recently developed aspects of the science. *Ready in November.*

Fifth Edition: Approx. 715 pages; 5½ by 8⅛; Probable price, $3.50

INTERMEDIATE DIFFERENTIAL EQUATIONS

By EARL D. RAINVILLE, *Assistant Professor of Engineering Mathematics, University of Michigan.*

This book is designed for use in a course to follow the usual one in elementary differential equations. Emphasis is placed upon development of the student's technique. The book trains the student in the construction of computable solutions for specific differential equations. Applications to engineering problems are given. An introduction is offered to several topics of importance in the classical theory. *Ready in November.*

213 pages; 5⅛ by 8¼; $2.75

FUNDAMENTAL RADIO EXPERIMENTS

By ROBERT C. HIGGY, *Assistant Professor of Electrical Engineering, The Ohio State University.*

Thirty-two basic experiments in electricity, electronics, and radio, with a full explanation of the principles involved, as well as the procedure to be followed in the laboratory. Suggestions on use of equipment, safety, and construction of equipment for the laboratory are included, and a large number of circuit diagrams are given. *Published in October.*

95 pages; 5½ by 8⅛; $1.50

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

to come, and it may be that no larger such instrument will ever be built.

Disregarding the mechanical problems, the larger a telescope, the greater its light-gathering power, the greater its ability to resolve close points of light, such as double stars, and the greater its magnification (if its focal length increases with its size). But more than offsetting resolution and magnification are the vagaries of the atmosphere, through which all light from sun, moon, and stars must pass. High magnification is used with large instruments only rarely, when "seeing" conditions are perfect. Light-gathering power is the prime purpose in building such an instrument as the 200-inch giant. However, the compensating feature is the comparatively small part of the sky which this telescope will be able to photograph at one time. In reflectors, particularly, the usable field of view is small, which is one of the reasons the newer type of telescope known as the Schmidt camera is so important. It has great light-gathering power combined with a large usable field.

"In astronomy as elsewhere," said Dr. Stebbins, "it is important to look for new methods before a given field is worked out. The modern photoelectric cell and amplifier are a million times as sensitive as similar equipment of a generation ago. But here again the precision with which the light of a star can be measured is limited by the twinkling of the star caused by atmospheric disturbances. An accuracy of one tenth of one per cent. is about the best obtainable at the present time."

With new equipment on the 100-inch telescope at the Mount Wilson Observatory, Dr. Stebbins and his colleagues have secured observations of stars in six colors, compared with previous work in only one or two colors. These studies have been applied to stars, nebulae, and especially to the dark nebulae between the stars. Dr. Stebbins pointed out that a large part of his own work in the past ten years has already become out of date because of improvements by these same investigators in the last year or two.

DISTINCTION BETWEEN PLANET AND STAR

DR. K. AA. STRAND, of Sproul Observatory, Swarthmore College, considers the invisible third component of the triple star 61 Cygni to be of the nature of a planet rather than a star. He believes further that a continuation of the accurate photographic observation of double stars will increase the number of such systems and will reveal stellar masses of such small magnitude that the boundary between planet and star, which has previously seemed clear enough, will disappear.

Two of five such unseen companions which he has discovered have masses about half that of the sun, and one has a mass about one tenth of the sun's; but all three are undoubtedly stars, only they are too faint to be seen.

Of the remainder, one is still somewhat doubtful because sufficient observational material is lacking, but the mass of the fifth one, in the 61 Cygni system, is known accurately as one sixtieth that of the sun, or sixteen times Jupiter's mass. Jupiter is the largest planet in the solar system, its mass equalling that of all the other planets combined.

Dr. Peter van de Kamp, director of the Sproul Observatory, reported on similar results with single stars. In this case, departures from straight-line motion across the sky are discovered by very carefully taken photographs; the departures are caused by invisible companions. Dr. van de Kamp presented a new such discovery—that of a companion to Luyten's star, the companion taking fifteen years to revolve about the visible star.

STAR SPEEDS

LIKE the molecules of air in a room, heavyweight stars move slowly and lightweight stars move rapidly. Researches by Dr. A. N. Vyssotsky, of the Leander McCormick Observatory of the University of Virginia, on the motions and distributions of dwarf stars appear to confirm this hypothesis.

Before a symposium on dwarf stars and planet-like companions, Dr. Vyssotsky explained how his selection of the comparatively small or "dwarf" stars was made from the relative intensities of different portions of their spectra, and independently of their apparent motions across the sky. Most other methods of making the selection have been based on such motions, and any attempt to determine the average real motion of such dwarfs as a class was handicapped by their having been selected on the basis of motion in the first place.

It had previously appeared that dwarf stars (mostly of the size of the sun and smaller) had more than their share of energy—that they moved through space too rapidly for their masses if the energy of the galaxy were equally divided. Dr. Vyssotsky has slowed the dwarfs down a bit, just enough to make it possible to apply the law of the equipartition of energy, important in physics and thermodynamics, to the majority of the stars in the galaxy.

VELOCITY OF SMALL K STARS

A STAR moving away from the sun at a speed of 155 miles per second (250 kilometers per second) has been found by Dr. Frank K. Edmondson, of Kirkwood Observatory, University of Indiana. This is a speed of over a half million miles per hour. This star is one of the smaller stars of the universe, of the spectral type called K, which makes it smaller and redder than the sun. In his reporting, Dr. Edmondson stated that his discovery was made in the course of an investigation of the motions of certain selected stars fainter than the tenth magnitude. His work indicates that the small K stars have a wider range in velocity than expected. To account for this, we must suppose that there are a large number of such so-called dwarfs, compared to the giant stars. Previously, the percentage of dwarfs had been supposed to be about 20 per cent. or 30 per cent., but the new results indicate that it may be as high as 80 per cent. Only about half a dozen stars are known with velocities exceeding 155 miles per second (250 kilometers per second).

BUY MORE WAR BONDS

WHAT MAKES "BETTER" THINGS BETTER?

THAT'S what most research workers are trying to find out—what factors underlie the "better" characteristics. For example, what happens when carbon is added to rubber? Why do different kinds of the same substance—carbon black, for instance—react differently when added to the same rubber mixture? If the answers to these questions were more exactly understood, it might be possible to develop still better rubber. The RCA Electron Microscope—with its enormous resolving and magnifying powers—is a logical approach to the study of these problems.

Why do sulfa drugs work? What do they do to germs? Why? What does this suggest? The RCA Electron Microscope offers fascinating possibilities to bacteriologists.

Why does one pigment have greater "hiding power" than another pigment apparently similar? Why are elastomers elastic? What is the secret of the strength of certain fibers? What more can we learn from crystalline structures? Why does chromium make "stainless steel" rust-proof? How do detergents—"wetting" agents—work?

Science knows part of the answers. But much remains to be learned. The RCA Electron Microscope is an ideal tool for such researches. This amazing instrument, by using electrons instead of light for illumination, has 50 to 100 times better resolving power than that of microscopes dependent upon light. This means that with the RCA Electron Microscope the research worker can see particles and details 50 to 100 times smaller (permitting useful magnifications of 100,000 diameters and more), since the high voltage electrons employed have a wavelength that is more than 50,000 times shorter than that of visible light.

Write for data and literature about this remarkable instrument, installed in important scientific and industrial laboratories, and serving the armed forces. Address inquiries to RCA Victor Division, RADIO CORPORATION OF AMERICA, Camden, New Jersey.

RCA

RCA ELECTRON MICROSCOPE

RCA Victor Division • RADIO CORPORATION OF AMERICA • Camden, N. J.

SCIENCE NEWS

Science Service, Washington, D. C.

A NEW B VITAMIN

A DISCOVERY linking a new B vitamin, folic acid, with blood cell production in the body has been made at the National Institute of Health at Bethesda, Md. This is the first time a vitamin has been linked with white blood cell production, although a relation between vitamins and red cell production has been hinted in two or three previous reports. An article in "Public Health Reports" by Dr. Floyd S. Daft and Dr. W. H. Sebrell, U. S. Public Health Service, states that folic acid will cure the anemia and white blood cell destruction caused in rats by sulfa drugs.

Sulfa drugs sometimes cause the same white blood cell destruction, called leukopenia and granulocytopenia, and anemia in human patients. The first practical result of the discovery, therefore, will probably be greater safety in sulfa drug treatment.

White blood cell destruction, or a condition in which there are too few of these cells, however, occurs also in patients who have not been getting sulfa drugs. Some of these cases have been attributed to other chemicals, such as those used in formerly popular headache remedies. In other cases no cause for the condition could be found. The findings on the rats suggest pretty strongly that in all such cases the underlying cause may have been a diet deficient in the folic acid vitamin.

Whether this vitamin plays as important a part in blood cell production as vitamin D plays in bone formation remains for future studies to determine. Folic acid was first introduced to the world in 1941 under that name by Dr. Roger J. Williams, of the University of Texas, but its only significance heretofore known was the cure of anemia in chickens. It is a member of the vitamin B group and is found more abundantly in liver, kidney, yeast and immature grass than in other materials analyzed, according to a report from John Bowden, E. B. McQuarrie and W. H. Peterson, of the University of Wisconsin. It got its name from the same Latin word that gives us the word foliage, because it was found abundantly in leaves.

Professor C. A. Elvehjem and his associates at the University of Wisconsin have also found that, although rats can thrive on a diet lacking both folic acid and another B vitamin, biotin, they stop growing and get sick when given a sulfa drug while on such a diet. The ill effects of the sulfa drug could be both prevented and cured by adding folic acid and biotin to the diet. Without the sulfa drug, the bacteria in the rat intestine presumably manufactures enough of these vitamins for the animal's requirements.

Dr. Daft and Dr. Sebrell were able to pin the blood disorders in rats definitely to lack of folic acid because they were able to use pure folic acid, instead of a vitamin concentrate, for curing the disorders. This material, which has only been isolated in the past few months, was furnished them by Dr. A. D. Emmett, of Parke, Davis and Co., and Dr. E. L. R. Stokstad, Dr. B. L. Hutchings and Dr. N. Bohonos, of Lederle Laboratories, Inc.—JANE STAFFORD.

THIAMIN

DR. VICTOR A. NAJJAR and Dr. L. Emmett Holt, Jr., of the department of pediatrics of the Johns Hopkins University, have discovered that human beings as well as rats and ruminant animals have in their bodies a factory that manufactures thiamin, or vitamin B_1. Their findings, which seem to give the first direct evidence for the biosynthesis of thiamin in man, are announced in the *Journal* of the American Medical Association.

For seven weeks four young men lived without sign of vitamin hunger disease on a diet completely lacking in thiamin. They were not getting the vitamin in pills or from any other outside source and they had been on low thiamin rations so long that little or none could have remained stored in their bodies from previous supplies. A similar group of four young men on the same diet regimen did develop signs of thiamin deficiency such as neuritis, swellings, loss of appetite and vomiting.

Tests of the four who stayed healthy without any outside supply of the vitamin showed that they were excreting large amounts of free thiamin in their intestinal wastes. Further tests showed that these four thiamin-starved young men were getting enough thiamin to stay healthy from bacteria in their intestines. Intestinal bacteria have been known to produce thiamin for rats and ruminants, but so far the question of whether man's intestinal bacteria could supply him with thiamin has been largely unanswered.

Whether the intestinal bacteria could supply enough thiamin to keep a man healthy for an indefinite length of time has not yet been determined. It may be that you have to feed bacteria minute amounts of thiamin or some other diet ingredient to keep the thiamin factory producing.

Diet rules regarding thiamin requirements seem likely to be revised in future as a result of these findings. A number of contradictory points may be explained, such as why beriberi from thiamin lack develops much more frequently among rice eaters than among those who live largely on other milled grains.

Sulfa drug treatment also is likely to be revised somewhat as a result of the discovery. Part of the search for the thiamin supply that was keeping the young volunteers healthy on a thiamin-starvation diet consisted in giving them doses of succinylsulfathiazole every four hours for one week.

At the end of the week, there was no more free thiamin in the intestinal wastes, evidence that the thiamin-producing bacteria were being destroyed or put out of production by the sulfa drug. This suggests that in future when doctors give a sulfa drug for intestinal infection, such as dysentery, they will be giving thiamin pills to make up for the production loss in the body's thiamin factory.

Outstanding New Texts in Biology

MANUAL OF COMPARATIVE ANATOMY

By OSMOND P. BRELAND, University of Texas, *McGraw-Hill Publications in the Zoological Sciences.* 252 pages, 5½ x 8. $2.00

Designed primarily for use in the laboratory in courses that involve the dissection of representative animals. Emphasis is placed upon the comparative aspects of the forms under study, by indicating homologies of structure in the various groups, and by inserting short paragraphs from time to time that compare certain systems of the particular animal being studied with the structure of other forms.

BIOLOGY. The Science of Life

By MARY STUART MACDOUGALL, Agnes Scott College. In collaboration with the late ROBERT HEGNER, The Johns Hopkins University. 963 pages, 6 x 9, 555 illustrations. $4.00

Keeping in mind the needs of beginning students and the preferences of instructors, Professors MacDougall and Hegner present an adroit combination of the principles and the types course, in an arrangement that allows an unusual degree of flexibility. To tell the story of biology, simply yet scientifically, is the aim throughout.

FUNDAMENTAL PRINCIPLES OF BACTERIOLOGY. *New second edition*

By A. J. SALLE, University of California at Los Angeles. 653 pages, 6 x 9, 253 illustrations. $4.00

Features of this text which have made it one of the best in its field are the emphasis on chemistry, the thorough explanations of phenomena, the sound morphological and physiological material, and the wealth of excellent illustrations. The present edition has been so completely revised and rewritten as to constitute a new book.

Laboratory Manual on Fundamental Principles of Bacteriology. *New second edition.* 184 pages, 6 x 9. $1.50

The experiments in this manual are based on important fundamental principles and facts of bacteriology that a student should acquire before proceeding to more advanced work in the field.

GENERAL ZOOLOGY

By TRACY I. STORER, University of California at Davis. *McGraw-Hill Publications in the Zoological Sciences.* 798 pages, 6 x 9, 551 illustrations. $3.75

Provides both a general biological approach and a systematic review, in order to give the student a rational understanding of the structure, function, and life characteristics of animals, as well as an orderly knowledge of animal types. The author has made a special effort to treat animals as they live in nature rather than as dead specimens in the laboratory.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

RED BLOOD CELL POWDER

SUCCESSFUL use of a blood powder from red blood cells, salvaged from plasma production, in speeding wound healing is reported by Dr. T. H. Seldon and Dr. H. H. Young, of the Mayo Clinic. The red blood cell powder is either dusted on the wound or applied with a sterile spatula. One or two applications are made daily and the wound covered after each with a dry, sterile dressing.

A five-inch-wide varicose ulcer, which almost encircled the patient's leg and had been present for eight years in spite of treatment by the usual accepted methods, was almost completely healed in eight weeks by daily application of the red blood cell powder. The blood powder has also given good results in a number of wounds following surgical removal of pilonidal cysts and fistulas. Infected wounds, amputation stumps that were not healing, and open chest wounds are among other types treated.

The results are not uniformly beneficial. In three cases the powder caused such severe, irritating, burning pain that it had to be discontinued. It is believed, however, that further study of the use of the red blood cell powder is warranted. The possibility of using red cells from other than human blood, such as beef blood, so as to have a supply when the source of human blood cells drops off after the war, should also, they suggest, be investigated.

The use in wound treatment of red blood cells salvaged from plasma production was first suggested and tried by Dr. J. J. Moorhead and Dr. L. J. Unger, of New York City. They used the cells in the form of a gelatin-like mass. Difficulty in keeping this semi-liquid material from being absorbed by the dressing or running out of the wound led to the development, by Dr. A. E. Osterberg, of the Mayo Clinic, of the red blood cell powder.

CARGO PLANES

HUGE cargo planes that will each carry 38 tons of perishable and valuable freight in weather-proof packages around the globe were predicted for the post-war world by J. H. Macleod, of the Hinde and Dauch Paper Company, speaking at Chicago before the air cargo meeting of the Society of Automotive Engineers. The biggest benefit for the manufacturer would be the partial or entire elimination of costly warehouses, Mr. Macleod declared.

Mr. Macleod predicted that reduction in air cargo freight rates, development of global skyway shipping routes and methods, and the availability of packages protecting every type of merchandise, will bring about post-war changes in business methods. Package engineers, he added, have developed not only corrugated boxes, thereby solving a majority of air cargo shipping problems, but have assured tailor-made packaging by means of special corrugated boards, coating materials, and adhesives with tough, flexible corrugated material used simultaneously to wrap and to pack.

Air-freighting of Lend-Lease and war material has resulted in the production of new bag packing or overwrapping materials of laminated papers and cellophane bags which control temperature and humidity, prevent corrosion, and mold formation and insect infestation. With air cargo on a global basis after the war these methods will be utilized to transport fruits, vegetables and all types of machinery to every corner of the world.

ITEMS

FIVE blisters of eruption have broken out in the basin of Mexico's volcano, Paricutin, just as when Jorullo volcano, 67 miles west of Paricutin, burst forth in 1759 it also produced 19 similar formations. As yet it is undetermined whether the little craters are openings in the lava flow with the molten material coming down under the surface of the volcano's main cone or whether they are real craters reaching down into the earth. Visitors at the edge of Paricutin's basin described the change in the volcano's activity as spectacular. This development was not unexpected to geologists studying the volcano, and Dr. Ezequiel Ordonez had published a prediction of this possibility.

THE new copper penny, scheduled for production on January 1, will contain slightly less copper and a little more zinc than the traditional "copper." Whereas the old coin was made of 95 per cent. copper and 5 per cent. zinc and tin, the new coin will contain 85 per cent. to 90 per cent. copper and 10 per cent. to 15 per cent. zinc. It will weigh a trifle less than the standard bronze coin and will be similar in appearance. The Mint will use as a base for the new cent small-arms cartridge cases recovered by military authorities from proving grounds, firing ranges and other training areas for troops. These cases contain 70 per cent. copper and 30 per cent. zinc, to which will be added enough virgin copper to bring the copper content up to the required amount. The old cases will be melted at the Mint for use. Due to a shortage of pennies, the 1943 zinc-coated steel penny will remain in circulation and continue to annoy Mr. Average American until it becomes sufficiently discolored with use.

NEW fiber insulating board standards have just been released by the National Bureau of Standards. They include classes of structural materials designated as building board, lath for plaster base, roof insulating board, interior board, and sheathing. The publication is a revision of the 1935 standards. The new standards cover minimum physical requirements and tests for thermal conductivity, transverse and tensile strength, linear expansion, deflection and water absorption. They cover also requirements for composition, construction and finish.

DEVELOPMENT of an "emergency" heat-resistant alloy has been disclosed in a report by Oscar E. Harder, assistant director, and James T. Gow, assistant supervisor of Battelle Memorial Institute, Columbus, Ohio, to the American Society for Metals. This alloy is low in nickel and chromium, two of the metals high on the wartime scarcity list. After a laboratory study of nearly 100 alloy compositions, a heat-resistant alloy was found that possesses adequate toughness for handling in the foundry and is low enough in hardness to be machinable. The new metal can be used at temperatures up to 1400 degrees Fahrenheit.

WILEY

NEW WILEY BOOKS

Ready in December

GEOMETRY WITH MILITARY AND NAVAL APPLICATIONS

By WILLIS F. KERN, *Associate Professor of Mathematics,* and JAMES R. BLAND, *Assistant Professor of Mathematics; both at the United States Naval Academy.*

Covers the fundamental, practical essentials of solid geometry and applies the principles and formulas to many problems dealing with military and naval situations. Simple proofs of the volume and surface formulas are included. The conventional treatment is simplified by basing the proof of each volume formula on Cavalieri's theorem.

152 pages; 5¼ by 8¼; $1.75

THE CHEMISTRY OF CELLULOSE

By EMIL HEUSER, *The Institute of Paper Chemistry.*

A study of the scientific aspects of the subject, useful both to the practicing chemist in industrial and other research laboratories and to the student who wishes to specialize in cellulose chemistry.

Approx. 630 pages; 5½ by 8⅜; Probable price, $7.00

THE CHEMISTRY OF ORGANIC MEDICINAL PRODUCTS

By GLENN L. JENKINS, *Dean and Professor of Pharmaceutical Chemistry, School of Pharmacy, Purdue University,* and WALTER H. HARTUNG, *Professor of Pharmaceutical Chemistry, School of Pharmacy, University of Maryland.*

For those concerned with pharmaceutical, chemical, biological, and medical science. Organizes the large number of organic medicinal compounds according to the accepted scheme of chemical classification.

Second Edition: Approx. 645 pages; 5½ by 8⅜; Probable price, $6.00

GENERAL CHEMISTRY

By H. G. DEMING, *Professor of Chemistry, University of Nebraska.*

An elementary survey of the subject, giving a clear presentation of principles and an interesting and accurate summary of the chief chemical industries and outstanding industrial materials. Completely up to date.

Fifth Edition: Approx. 715 pages; 5½ by 8⅜; Probable price, $3.50

SECOND YEAR COLLEGE CHEMISTRY

By WILLIAM H. CHAPIN, *Emeritus Professor of Chemistry,* and L. E. STEINER, *Associate Professor of Chemistry; both at Oberlin College.*

Takes into account the new discoveries and general development of chemistry in recent years. Much up-to-date material on such subjects as atomic radii, the distribution of velocities of molecules, crystalline solids, the chemical bond and its relation to the structure of compounds.

Fifth Edition: 582 pages; 5½ by 8⅜; $3.75

JOHN WILEY & SONS, Inc., 440-4th Ave., New York 16, N. Y.

SCIENCE NEWS

Science Service, Washington, D. C.

SAMOS

SAMOS is an ancient Greek island with an honorable history going back long before the birth of Christ. It has passed through many vicissitudes and under many rulers, but its people have always at heart remained loyal to Greece. Up until 1912, when it was annexed to Greece, it had been for many years a possession of Turkey. However, since 1835 it has held an advantageous position, being in fact self-governing, though tributary to the Turkish Empire. Its people have remained for generations members of the Greek Orthodox church.

The Dodecanese Islands, in which Samos is not included, were annexed by Italy the same year that Greece annexed Samos. All these islands, relatively near the Turkish coast line and formerly Turkish possessions, are close to the shipping route from Cyprus and the eastern Mediterranean to the Dardanelles. They are, however, approximately 150 miles across the Aegean from Athens on the mainland of Greece.

Samos extends east and west a distance of about 27 miles, and is one half that distance from north to south. It contains approximately 300 square miles of territory, most of which is fertile farm land. A mountain range extends the length of the island, with one peak near the western end over 4,700 feet high. It has several good harbors. Its principal crops are from its vineyards. Oil, silk, cotton, tobacco and raisins are also grown. Cigarette making is an important industry.

Historians will remember that Samos was the birthplace of the philosopher Pythagoras, whose name and image appeared on coins of Samos in ancient times. The island was the home of a school of sculptors with which Rhoecus, the architect of the Samian Temple of Hera, was associated. Rhoecus and Theodorus, both of this school, are credited with inventing the art of casting statues in bronze.

THE USE OF FLUORIDES IN INDUSTRY

THAT the increasing use of fluorine compounds in industry may bring a new industrial health problem was pointed out by Dr. Robert A. Kehoe and Edward J. Largent, of the Kettering Laboratory of the University of Cincinnati, at the Pittsburgh meeting of the Industrial Hygiene Foundation.

"Since 1940, the annual industrial consumption of fluorine compounds has exceeded 500,000,000 pounds. Production of steel, hydrofluoric acid, glass and enamel has accounted for almost all the compounds used. Although acute poisoning by fluorides is not uncommon in the home, in industry acute injuries have occurred infrequently and have almost always resulted from accidents involving hydrofluoric acid."

Injury has been reported from prolonged exposure in industry to air contaminated by dusts containing fluorine salts. Little has been reported concerning the effects of gaseous fluorite. The injury reported in chronic intoxication was in the nature of an abnormal hardening of the bones which was detected by x-ray examinations.

Although fluorine compounds are employed in at least twenty-five industrial processes, the hazards involved have not been reported. Workmen in some industries excrete an elevated amount of fluorine. Study of one person indicates that when abnormally large amounts of fluorine are being absorbed, the excretion gives an indication of the rate at which fluorine is being stored in the bones. However, the time interval required for injury to result from this bone storage has not been determined.

Fluorine has received considerable attention in another connection, that of its effect on human teeth. Small amounts in drinking water cause the disfiguring condition, mottled enamel, while much smaller amounts seem to protect the teeth from decay.—JANE STAFFORD.

THE PRE-BIRTH PERIOD IN FUR-BEARING ANIMALS

EXPERIMENTS conducted at Swarthmore College by Professor Robert K. Enders and Oliver P. Pearson have demonstrated that the long and uncertain period of gestation in certain fur-bearing animals of the weasel family may be materially shortened by the use of artificial light. Fur farmers, now doing their utmost to increase the supply of furs for aviation and arctic-alpine uniforms, are keenly interested. The research was carried out in collaboration with the U. S. Fish and Wildlife Service.

The success of Professor Enders and Mr. Pearson in shortening the time of waiting for the young to be born is based on certain basic facts in embryology. In all mammals, the union of male and female sex cells after mating is followed by an initial period of rapid cell division, at the end of which the early embryo consists of a hollow sphere of cells, called the blastocyst. At this point, the blastocyst attaches itself to the wall of the mother's uterus, from which it will draw nourishment until birth takes place. This process is known as implantation.

It was found that in some fur-bearers of the weasel tribe, the embryo develops as far as the blastocyst stage, and then stops, often for many weeks, before implantation and further growth take place. This is notably the case with the marten, which mates in July and August and normally does not give birth until April.

Shortening of three or four months in the pre-birth period was attained by artificially lengthening the lighted hours in the female martens' quarters with electric lamps. The delay in implantation was eliminated, and the young were born late in December.

Somewhat similar results were obtained with mink. The period of gestation in this animal is very variable, lasting from 41 to 76 days. This variation is thought to be due also to a delayed implantation of the early embryo. By artificially increasing the length of day, the gestation period in the mink was shortened an average of about three days.

It is suggested that the long pause in embryonic development in these animals under natural conditions results from the shortening of daylight hours in the autumn,

ORGANIC CHEMISTRY

Hill and Kelley

A text with a *purpose*—

It introduces the student to the newer concepts. It presents a clear discussion of atomic structure, linkages, the nature and strength of bonds, resonance and hydrogen bridges with relation to the mechanisms of organic reactions. This theoretical material is repeatedly applied throughout the text. Particular attention is given to the specific reagents, experimental conditions, yields and the scope of reactions. Physiological applications are given detailed and up-to-the-minute treatment. It is designed for a thorough, one-year course in organic chemistry.

Teachers say:

"This is an excellently written textbook"

"It allows a wide choice of subject matter"

"The exercises are well chosen from the point of view of student interest and teaching value"

"Especially impressed by the simple and direct treatment of theoretical aspects"

"The mechanisms of organic reactions are adequately treated"

"The text is well organized, thorough and up-to-date"

By G. Albert Hill, Wesleyan University,
and Louise Kelley, Goucher College

919 Pages. $4.00 (1943)

THE BLAKISTON COMPANY, Philadelphia 5, Pa.

and that implantation and completion of the pre-birth process is stimulated by the lengthening of the daylight periods in spring.

THE NEW CHEMICAL DE-SALTER

A NEW chemical that takes the salt out of sea water in 20 minutes and permits a flier to carry the makings of a 14-day supply of life-sustaining drinking water in his rubber life-raft has been recommended by the Naval Medical Research Institute, and is already in production, climaxing more than a year of all-out research in which innumerable de-salting devices have been invented and demonstrated. The new chemical de-salter, which weighs only 3½ pounds and converts more than 14 pints of sea water into drinking water, was designed to prevent death from thirst and tissue dehydration among fliers drifting on rubber life-rafts.

At least a dozen methods of distilling or chemically de-salting sea water for fliers have been tested by Naval Medical Research Institute chemists and physicians but were rejected because of awkwardness, poor yield, excess weight or harmful reactions. A small can is the only water supply which downed fliers have been taking aboard their life-rafts.

The new chemical, which is carried in the form of briquets the size of a small candy bar, is the result of many months of research on the part of the Permutit Company of New York. When dropped into a plastic bag filled with sea water, the chemical quickly absorbs the dissolved salts, permitting them to be filtered out as the flier sucks the water through a plastic tube. Each briquet weighs only one-sixth as much as the drinking water it produces and takes up only one-tenth as much space, thus keeping within all-important plane-loading limits.

As a result of original tests made by the Navy Department and later corroborated by the American Airlines, officials of the American Airlines announced that they had adopted this sea water de-salting process for all over-water cargo and passenger flights and had recommended it to other airlines operating flights under the Air Transport Command. At a "shipwreck demonstration" in the Atlantic Ocean off Long Island, sea water was scooped up in the transparent bag and a briquet was dropped in. The bag was sealed and shaken and the chemical absorbed. Salts were retained by a cloth filter as the water was sucked out.

Chemical methods of converting sea water to drinkable water have been sought for centuries. Attention has been focused on the problem of water-supply for life-rafts by the vast amount of over-water flying and fighting, especially in the Pacific war zones where two- and three-week raft "squattings" have become commonplace. The Rickenbacker and Doxon-Aldrich-Pastula sagas, describing the tortures of thirst aboard life rafts, showed that lucky catches of fish, birds and rain-water were all that prevented their deaths from thirst. Medical opinion holds that water is more important than food in sustaining life, for dehydration of tissues is usually fatal.

ITEMS

PREVENTION or cure of seasickness can be achieved in three out of four cases by pink pills developed by the Royal Canadian Navy. The formula for the remedy, which appears to be equally effective in air sickness, is a military and naval secret. The remedy has no harmful effects and does not reduce fighting efficiency. The pink capsules are now being manufactured in quantity and will shortly be issued to ships for general use at sea. They will probably not be available for civilian use till after the war. The new remedy was developed after extensive research, for a medicine to keep naval personnel at top efficiency, particularly during the first two days of a voyage when seasickness is most likely to occur, and to protect invasion troops from being so disabled by seasickness that they can not fight when landed. Surgeon Captain C. H. Best, R.C.N.V.R., co-discoverer of insulin, and Dr. Wilder Penfield, of the Montreal Neurological Institute, head the group of investigators who produced the remedy.

THAT parachuting British medical units to care for the wounded in the advance line of action proved successful in the Tunisian campaign, is reported by the London correspondent of the *Journal* of the American Medical Association. This revolutionary advance in army medical service may lead to the adoption of air-borne medical units on a large scale by the British army. At present only the air corps is equipped to land surgeons and ambulance units by parachute and glider. A medical unit consisting of ten men, including a surgeon lieutenant, was dropped by parachute close to the line of battle in the Tunisian campaign. During one day alone this unit attended 162 wounded. Due to the medical attention made immediately available by this means, the lives of all but one man were saved. The unit arrived complete with full dressing station equipment, operating apparatus and instruments, anesthetics, sterilizers, medicines and dressings. Normally an air-borne medical unit can assemble its operating equipment within ten minutes of landing. Sufficient medical supplies and food are carried with the unit to last for several days without supplementary supplies.

THE best storage place for fabrics is not the traditional attic but a dark storage closet on a lower floor, according to results of a four-year test conducted by textile experts of the U. S. Department of Agriculture. Most attics become very hot in the summer, and heat has been found to cause deterioration of stored fabrics. Tests were made of both new and desized cotton sheets and degreased woolen samples stored at 102 degrees Fahrenheit, the average attic temperature, and at room temperature. Changes in these fabrics were not enough to make them unserviceable, but they were found to deteriorate more in hot-storage. The fabrics became weak and tender, and cottons and linens yellowed. Linen stood up better than other fabrics under the tests. Greater chemical deterioration was caused when light reached the stored fabrics, light damaging linen more than high temperature.

Solved!

Your gift problem this year

THE HARVARD BOOKS ON ASTRONOMY

Edited by HARLOW SHAPLEY and BART J. BOK

Harvard College Observatory

These fascinating books on various phases of astronomy are the solution to the problem as to what to give the scientist, the teacher or student this year. Together, the books present a comprehensive survey of astronomy; individually they describe, exhaustively and with a maximum of interest and exciting narrative, their own particular fields and problems.

Volumes now ready, are:—

GALAXIES—*Shapley*

This volume, just published, is based on extensive original information concerning stars, star clusters and distant external systems that resemble our own Milky Way Galaxy. The explorations described cover hundreds of millions of light-years in travel to spaces now reached by the greatest photographic telescopes. By Harlow Shapley. **126 Illus. 229 Pages. $2.50** (1943)

ATOMS, STARS AND NEBULAE—*Goldberg and Aller*

In this volume, the reader gets a genuine thrill of discovery as he probes into the seething atmospheres of stars and digs into their interiors. There is a fascinating account of stellar rainbows, atoms, molecules, etc. By Leo Goldberg and Lawrence H. Aller. **150 Illus. 323 Pages. $2.50** (1943)

BETWEEN THE PLANETS—*Watson*

This book summarizes our knowledge of comets, meteors, asteroids and meteorites, and gives a description of the latest discoveries. It also considers the multitude of vexing problems yet unexplained. By Fletcher G. Watson. **106 Illus. 222 Pages. $2.50** (1941)

EARTH, MOON AND PLANETS—*Whipple*

This book carries the reader, in his imagination, below the clouds on Venus, Mars and the giant red planets into the depths of the earth and to the rough and airless surfaces on the Moon, Mercury and Pluto. A planet finder and star chart is included. By Fred L. Whipple. **140 Illus. 293 Pages. $2.50** (1941)

THE MILKY WAY—*Bok and Bok*

The dust and gas in the vast spaces between the stars, the compositions and dimensions of star clusters, the appearance of our galaxy to an observer in the Andromeda nebula, and the problems of the past and future of our galaxy are discussed. Large scale photographic maps of the Milky Way, and portraits of leading scientists in the field are included. By Bart J. Bok and Priscilla F. Bok. **93 Illus. 204 Pages. $2.50** (1941)

THE STORY OF VARIABLE STARS—*Campbell and Jacchia*

This book introduces the reader to the technique of observation and then proceeds to analyse the present state of our knowledge of variable stars. A list of brighter variables, a Julian calendar and other useful tables are included. By Leon Campbell and Luigi Jacchia. **82 Illus. 226 Pages. $2.50** (1941)

THE BLAKISTON COMPANY, PHILADELPHIA 5, PA.

SCIENCE NEWS

Science Service, Washington, D. C.

THE SPEED OF PHOTOGRAPHIC FILM

CONFUSION created by numerous methods of rating the speed of photographic film will be eliminated when manufacturers publish the American Standards Association speeds for their films.

In the past each manufacturer of films and exposure meters rated the many kinds of films now used by photographers with a system of his own. These many different ratings often left the user of film in doubt about the exposure needed for the film he wished to use; or the rating given him would not be the one best suited for the use of his light meter.

The single well-defined system of expressing the sensitivity characteristics of film now adopted will remove this confusion, and manufacturers need publish only one set of ratings.

All standard films will be rated by two methods. One method, called the ASA speed, gives an absolute value, indicating the minimum camera exposure which the film must receive in order to produce a negative from which an excellent print may be made. The other called American standard speed number, is the number giving recommended exposures for normal photographic practice to yield the highest number of excellent pictures.

The American standard speed number falls approximately halfway between the Weston and General Electric numbers. This makes possible its use with existing photoelectric exposure meters with no change in the dials. The latitude of most film will take care of the difference in the ratings.

Branches of the armed forces are now having meters made with the new numbers on the calculators. After the war probably all meters will use the new numbers. Film furnished the armed forces has been rated by the new method for some time, but the number is called exposure index and is designed to be used with the American Emergency Standard Photographic Exposure Computer, a small book which allows computation of exposure by observation of latitude, scene, brightness and type of day.

The American Standards Association had the cooperation of all leading film and equipment manufacturers, who will publish the film speed numbers and gradually incorporate the system in their products.

THE SMALLEST "QUANTUM" OF ENERGY

THE smallest "quantum" of energy, the amount that would be emitted by a single atom making one vibration per second, if that were possible, has been somewhat enlarged by new measurements made with the help of x-rays. The measurements, reported in *Nature*, were carried out by the physicist, Professor Per Ohlin, of the University of Uppsala, Sweden.

Previous measurements by this method gave results 0.3 to 0.4 per cent. smaller than those calculated from the atomic theory and other experimental data. The discrepancy was due to the difficulty of determining just where the x-ray spectrum ends on the short wave side, which is the principal observation required by this method. This is as difficult as, or more difficult than, determining precisely where the edge of a rainbow is, especially on the blue side.

A more precise way of determining this limit removed the difficulty and gave results in satisfactory agreement with those calculated from the atomic theory. The quantity determined by this method is not directly the smallest quantum. Planck's radiation constant as it is more familiarly known to the physicist, but its ratio to the smallest electric charge, h/e. Professor Ohlin's final result for the ratio is 1.3787 divided by 10^{17} (1 followed by 17 zeros) which is the same, within the limits of experimental error, as that derived from the atomic theory. Since the smallest charge, e, is known, h is readily found.

To find the precise point where the x-ray spectrum fades to nothing, the method had been to use a narrow band of the spectrum near the end and measure its increasing intensity as the voltage was raised. A curve of these intensities was then plotted, and the curve was extrapolated downward, continued by the eye, to the level of zero intensity. This should have given the voltage at which that particular band of x-ray frequencies began to be emitted, but it didn't quite.

Professor Ohlin, by using a much narrower band and changing the voltage by very small steps (2 volts), which was made possible by the use of a more powerful and efficient x-ray apparatus, found an irregularity at the lower end of the curve quite undisclosed by the previous coarser measurements. This accounted for their failure to get a result in agreement with that derived from the atomic theory, which result is thus confirmed and may be taken to be correct together with the theory and measurements on which it is based.

FUEL SHORTAGES IN GREAT BRITAIN

FUEL shortages in Great Britain, in wood, coal, oil and gasoline, are directly responsible for an intensive fuel conservation program put into operation early in the war, and also for the establishment of scientific research projects covering both the conservation of fuel and the development of special fuels from English coal. These measures were discussed at the New York meeting of the American Society of Mechanical Engineers by W. C. Schroeder, of the U. S. Bureau of Mines.

Conservation is being carried out through education and rationing, he stated. The gasoline rationing that the American public endures is mild compared with that in Great Britain. All pleasure driving is banned. Gasoline can be obtained only to go to work in essential industries and where no public transportation is available. Industrial users of coal are cut by nearly 8 per cent. of their normal amounts. Home owners are expected to maintain in their houses a temperature not over 60 degrees, and to avoid all waste of heat, water and electricity.

Research projects are those of immediate importance that can be solved quickly. They include the development

Recommended for Navy V-12 Courses

For M8 and M9 (Elementary Navigation and Nautical Astronomy, Ia and IIa)

NAVIGATION

By LYMAN M. KELLS, WILLIS F. KERN, and JAMES R. BLAND, U. S. Naval Academy. 479 pages, 6 x 9, 392 illustrations. Textbook edition, $3.75

A complete course on the subject, dealing with the best and latest methods used in navigation. Unusual simplicity is obtained by logical arrangement of material and careful preparation for each development. The book outlines the mathematical background for each theory of navigation, and treats each one thoroughly by means of clear exposition, illustrative examples, and graded exercises.

This text is also available in two separately published volumes:

Part I. Coastal and Inland Waterways Piloting. 288 pages, 6 x 9, 265 illustrations. Textbook edition, $2.50

Each important topic is first treated in detail so that the facts and processes connected with it are well understood. Then follows a set of exercises, calling attention to the most important ideas, and causing the student to think about the situation, reason about it, and become familiar with its variations. Next, easy numerical problems are presented, followed by problems of greater difficulty, corresponding to those encountered in the actual practice of piloting.

Part II. Celestial Navigation and Nautical Astronomy. 191 pages, 6 x 9, 127 illustrations. Textbook edition, $2.00

Navigational theories are thoroughly treated in systematic, independent discussions, with a wealth of exercises graded according to difficulty. The book considers the four important methods of solving a special triangle of which two sides and the included angle are known. Some of the most recent material deals with the Hagner Planetarium and the Rude Star Finder for locating heavenly bodies and understanding their motions, and with the Sonic Depth Finder for locating position and making landfalls even in darkness and fog.

For C6 (Engineering Materials)

CHEMISTRY OF ENGINEERING MATERIALS. *New fourth edition*

By the late ROBERT B. LEIGHOU, Carnegie Institute of Technology. Revised by Members of the Chemistry Faculty of the Carnegie Institute of Technology; J. C. WARNER, Editor. *International Chemical Series.* 645 pages, 6 x 9, 91 illustrations. $4.50

The primary purpose of this widely used book is to provide information on the chemical properties of engineering materials, so that these materials may be more intelligently selected and used. The new edition contains detailed discussions of synthetic rubbers, synthetic resins as constituents of organic protective coating, heat insulators, high-octane motor fuels, and high-pressure lubricants. New chapters have been added to cover metallic and inorganic protective coatings, the technology of shaping metals and alloys, abrasives, glass, and organic plastics.

QUANTITATIVE CHEMICAL METHODS FOR ENGINEERING STUDENTS

By OTTO M. SMITH and L. F. SHEERAR, Oklahoma Agricultural and Mechanical College. In press—ready in January

This forthcoming manual, designed for use with the above text, meets the need of engineering students for more extensive knowledge of the practical application of chemistry in its quantitative engineering aspects than is usually given in the general chemistry course or in a third semester which is sometimes devoted to qualitative or quantitative analysis. The manual aims to teach techniques in the use of the chemist's tools such as the analytical balance, volumetric equipment, and standard solutions, and to show the engineer how to analyze those materials that he will use in his professional work.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

of producer-gas from coal to propel automobiles, trucks and buses; an efficient mixture of powdered coal and oil for factory furnaces, and the conversion of coal to oil and gasoline.

Because of the lack of forests, wood or charcoal can not be used extensively in England for producer-gas as they are in Germany and other countries. Anthracite and high-temperature coke are now yielding a satisfactory gas in Great Britain as a result of recent research. The coke-gas has greater activity when sprayed before using with a sodium carbonate solution.

Colloidal oil, made of a mixture of coal and oil, has been in use in England since World War I, but is more widely used now, perhaps because of better mixtures resulting from recent research. Experimentation in the conversion of coal to oil and gasoline did not start in England as early as in Germany, where research work started in 1913. About 1930, an English chemical company became interested, constructed a plant, and has been in commercial operation since 1935.

"Governmental and scientific circles in Great Britain are now fully awakened to the importance of these processes for making liquid fuels from coal. It is to be hoped that this same realization of the potentialities inherent in these developments will arise in the United States."

DISEASE RESISTANCE AND DIET

A NEW link between diet and resistance to infection appears in studies reported by Dr. C. A. Mills and Dr. Esther Cottingham, of the College of Medicine of the University of Cincinnati, at the Cincinnati meeting of the American Society of Tropical Medicine.

When mice, rats and guinea pigs were starved of vitamins to the point where they failed to grow properly, the activity of their phagocyte cells was likewise reduced. Phagocyte cells play an important part in fighting off infection because of their ability to dispose of disease germs.

The reduction in phagocytic activity was found when the animals were on diets deficient in the following vitamins: thiamin, or B_1; riboflavin, pyridoxine, pantothenic acid and choline, also members of the vitamin B family, and vitamin C. Two other B vitamins, inositol and para-aminobenzoic acid, were without effect, but lack of vitamins A and D combined seemed to reduce the phagocytic activity.

A relation between diet, particularly its vitamin content, and resistance to infection has long been suspected. The authors point out that past evidence shows that this is not a matter of vitamin deficiency affecting directly the resistance given by another class of the body's germ-fighters, the antibodies. These substances are more specific in their germ-fighting activity than the phagocytes and are responsible for the kind of disease resistance obtained from vaccines.

It is suggested that the discovery of reduced phagocyte activity resulting from vitamin deficiency may give a valuable means for detecting slight degrees of vitamin starvation which do not show symptoms of frank sickness.

ITEMS

CLOSE agreement between the observations of the abundance of clouds of calcium gas on the sun and Smithsonian Institution measurements of daily variations in solar radiation has lent new support to the theory that day-to-day weather changes can be predicted from solar observations. Dr. Charles G. Abbot, secretary of the Smithsonian Institution, reported to the Cincinnati meeting of the American Astronomical Society that a tentative trial of solar forecasting of temperature changes at Washington was carried on for 201 days. The results agreed about 60 per cent. of the time, which is better than can be ascribed to chance alone. The observations of calcium clouds were made by the monks at Ebro, Spain, independently of Dr. Abbot's work, and he used their work combined with his own as a basis for the weather forecasting. He stated that weather changes connected with a solar change of activity start about three days before and last for 14 days after such a change. Referring to the longer and better known solar cycle of 23 years, Dr. Abbot predicted that repetitions of past great droughts in the Northwest will occur about 1975 and again about 2020.

A NEW camera makes it possible to locate aerial photographs exactly in terms of latitude and longitude. By use of zenith cameras designed for night use, aerial maps made by the Army and Navy over New Guinea, North Africa and other regions of military importance can be located within 40 or 50 feet. Zenith cameras, developed by the Eastman Kodak Company at the request of the Army, offer an accurate shortcut to celestial navigation. Special camera outfits are placed at one or more points within the area being mapped. By coordinating the star data from the cameras with the land pictures from aerial mapping, all guesswork as to the exact location of a mapped area is removed. One camera photographs the portion of the sky immediately overhead; while another, connected by electrical cables, photographs three navigation watches set on Greenwich time. An automatic timing unit operates and synchronizes the two. This new device gives all the data necessary to determine latitude and longitude exactly. A catalogue of the stars makes it possible for men who know nothing about astronomy to establish the exact position of the scene.

GLASS fibers are helping the production of industrial alcohol needed by the new synthetic rubber industry and for other war uses in a relatively new application described by Dr. Joseph H. Koffolt, of the Ohio State University, at the annual meeting of the American Institute of Chemical Engineers. The glass fibers are used to pack columns employed for the distillation of industrial alcohol, replacing the tinned-copper bubble plates generally used for this purpose before the war. Tests in commercial production have now been running for a year or so with the glass fiber and prove that the material is satisfactory.

NEW WILEY BOOKS

INDEX FOSSILS OF NORTH AMERICA

By HERVEY W. SHIMER, *Professor Emeritus of Paleontology,* and ROBERT R. SHROCK, *Associate Professor of Geology; both at Massachusetts Institute of Technology.*

Replacing the original Grabau and Shimer's "North American Index Fossils," this is a reference work for lecture and laboratory study in advanced courses in invertebrate paleontology. It will also be of value for various theses investigations in paleontology and stratigraphy. No comparable book exists: There are over 8,000 individual illustrations; approximately 7,500 species are described and figured. Specialists in nearly all the larger divisions have either revised the material in the book or have assisted the authors in doing so. Ready in January.

Approx. 729 pages; Profusely illustrated; 7½ by 10¾; Probable Price, $20.00

PHOTOMICROGRAPHY Theory and Practice

By CHARLES P. SHILLABER.

The most comprehensive treatment of the subject in any language. A large part of the content is devoted to the actual procedures to be followed, with explanations of how to obtain the best results on various kinds of subject matter. The book covers the adjustments and various techniques relating to the microscope and the illuminating system; the use of sensitive material; and the preparation of the specimen. Ready in January.

Approx. 726 pages; 359 illus.; 5½ by 8⅜; Probable price, $7.50

QUANTUM CHEMISTRY

By HENRY EYRING, *Professor of Chemistry, Princeton University;* JOHN WALTER, *Instructor in Physics, Princeton University;* and GEORGE E. KIMBALL, *Assistant Professor of Chemistry, Columbia University.*

An advanced treatment of the subject. Although the book contains most of the material usually offered in the introductory books in quantum mechanics, it goes farther in applying the results to chemistry. It includes treatments of the theory of reaction rates, optical activity, molecular structure, spectroscopy, and group theory. Ready in January.

Approx. 386 pages; 48 illus.; 5½ by 8⅜; Probable price, $5.00

APPLICATIONS OF ELECTROCHEMISTRY

By W. A. KOEHLER, *Professor of Chemical and Ceramic Engineering, West Virginia University.*

Volume II of "Principles and Applications of Electrochemistry" (Volume I on Principles is by H. Jermain Creighton). A thoroughly revised edition, with up-to-date material added on many subjects, including new data on certain types of storage battery, on chlorine-caustic cells, on magnesium from sea water, on new types of furnace, on electroplating, and other important matters. Ready in January.

Second Edition: Approx. 586 pages; 262 illus.; 5½ by 8⅜; Probable price, $5.00

GEOMETRY WITH MILITARY AND NAVAL APPLICATIONS

By WILLIS F. KERN, *Associate Professor of Mathematics,* and JAMES R. BLAND, *Assistant Professor of Mathematics; both at the United States Naval Academy.*

Covers the fundamental, practical essentials of solid geometry and applies the principles and formulas to many problems dealing with military and naval situations. Simple proofs of the volume and surface formulas are included. The conventional treatment is simplified by basing the proof of each volume formula on Cavalieri's theorem. Published in November.

152 pages; 5⅛ by 8¼; $1.75

JOHN WILEY & SONS, Inc.

440 Fourth Avenue New York 16, N. Y.

SCIENCE NEWS

Science Service, Washington, D. C.

STARS FATTER AND "SOLIDER"

THAT we live in a much fatter and "solider" galaxy of stars than previously supposed was announced by Dr. Harlow Shapley, director of the Harvard College Observatory, in the twenty-second annual Sigma Xi lecture at the University of Chicago.

An enormous thickness of the Milky Way, the galaxy or "universe" of stars in which the sun and earth are located, is established definitely through a general revision of the distances of the globular star clusters which has just been completed at Harvard. No large alterations are found necessary in the diameters of the galaxies, but Dr. Shapley confirms his earlier evidence that our own wheel-shaped galaxy is surrounded by an extensive haze of stars that is approximately spherical in shape.

The overall thickness of the surrounding star haze is found by Dr. Shapley to exceed 100,000 light years, that is, it would take light 100,000 years to cross the galaxy, traveling at its speed of 186,000 miles per second. This is 580,000,000,000,000,000 miles.

We are still located about 30,000 light years from the center of the Milky Way, as the distance calculations made possible by the new researches caused little revision.

Dr. Shapley said: "The original determination of distance and distribution of globular clusters led to the abandonment of the heliocentric hypothesis of the sidereal universe since it pointed to the star clouds in Sagittarius as a region around which the globular clusters are aggregated. That region was assumed to be the center also for all stars of the Milky Way. The clue given by clusters was later verified by studies of motions of stars around that center, again demonstrating that the sun and earth are in the outer part of the wheel.

"Cosmic dust and gas clouds between Milky Way stars have hindered our direct exploration of the home galaxy and especially prevented measurements of accurate distances for remote objects that are in low galactic latitudes, that is, near the Milky Way circle. But in higher latitudes far from the Milky Way band we escape much of the space-absorption and when more than 20 degrees from the galactic circle we can see through the dust. In those latitudes from 20 degrees to the poles at 90 degrees on both sides of Milky Way, we can now safely measure positions of globular clusters in space.

"One test for transparency of space is through measuring colors of remote objects. If there is reddening or color excess over normal for average stars we suspect presence of absorbing dust and gas in interstellar space. A better test is now provided by external galaxies. If they are present and numerous in the field of globular clusters, space is clear. If absent, they have been blocked out by space absorption. If present but scarce, the transparency is partial."

The determinations of the distances in the Milky Way were made with the help of the Harvard Observatory's extensive surveys of faint and distant galaxies, through the use of new studies of the magnitudes of variables and giant stars in globular clusters and with new measurements for nearly all globular clusters in latitudes higher than 20 degrees. These researches were reported for the first time by Dr. Shapley.

"The globular star clusters average more than 100,000 times the brightness of the sun. When compared with clusters in neighboring galaxy in Andromeda they appear to be systematically brighter or more probably they indicate that distance of the Andromeda nebula is now considerably underestimated."

NICOTINE SOLUTION FOR GREENHOUSE PESTS

RESEARCH by U. S. Department of Agriculture entomologists has demonstrated that the aerosol method, used now against malaria mosquitoes on many American fighting fronts, is effective also in attacks on insect pests that damage plants growing in greenhouses and other closed spaces. The only difference is that whereas pyrethrum is the poison used in the mosquito-killing bombs, the standard munition in chemical warfare against aphids is nicotine.

The "bombs" used are small, grenade-shaped containers loaded with the insecticides dissolved in Freon, the compound first brought out for the cooling coils of electric refrigerators. It is a gas at ordinary temperatures, but becomes a liquid under slight pressure. The bombs do not actually burst, but the sudden release of the internal pressure when they are opened sends the poison-loaded Freon vapor out into all corners of the room or tent that is being purged of its pests. Harmless to humans, the vapor is deadly to insects.

The tests showed that a given quantity of nicotine released as an aerosol from a Freon bomb will kill the insects in twice as many cubic feet of greenhouse space as when burned for fumigation in the method now used, besides eliminating the fire hazard involved at present.

It is not expected that the new method will come into general use until after the war because of present difficulty in obtaining necessary materials. All Freon bombs that can now be produced are needed for the protection of troops and the "de-mosquitoing" of airplanes in malaria-infested regions.

SEASICKNESS

A COMBINATION of two drugs which acting together may prevent seasickness has been discovered by Captain Stewart Wolf, M.C., A.U.S., in studies at the Ninth General Hospital, U. S. Army, the Boston City Hospital and Harvard Medical School, and the New York Hospital and Cornell Medical College. Announcement of the discovery appears in the *Journal of Clinical Investigation*. The drugs are atropine, the antispasmodic drug extracted from belladonna, and prostigmine, the synthetic drug which has been used in treating the muscle weakness disease, myasthenia gravis.

Neither of these drugs would be effective alone. In

A New Book of Timely Importance

MILITARY MAP INTERPRETATION

By A. K. LOBECK
Professor of Geology, Columbia University
and Captain WENTWORTH J. TELLINGTON, U. S. Army

In press—ready soon

IN this forthcoming book the authors meet the urgent need for an authoritative text that provides in a single volume a complete yet simple presentation of the fundamental methods and modern applications in map reading. Basic principles and present-day techniques are described clearly and interestingly, with stress upon the habits and mental attitudes needed in fine map reading, such as the value of a good memory, powers of observation, and judgment of distance, time, and direction. The student is shown how to visualize and understand the landscape depicted by the map, and is instructed in the common use of air photographs.

The Schunemunk Quadrangle has been selected as a representative map to serve as the basis for all the technical instruction. As a foreign parallel, the Mannheim Map has been included to introduce the student to the field of international maps. A feature of the text is the large number of problems, discussion topics, and review exercises, culminating in a set of composite problems involving all aspects of the course.

Part	I.	Basic Map Reading
	II.	Topographic Forms
	III.	Elementary Problems and Methods
	IV.	Advanced Map Reading
	V.	Landscape Types
	VI.	Air Photographs
	VII.	Comprehensive Problems. Problems on the Mannheim Map

Send for a copy on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C.2.**

combination, however, they prevented nausea in humans even when gagging was induced by touching the throat with a tongue depressor. In other tests, irrigation of the ear canal with icy cold water for five minutes failed to induce nausea when these drugs had been given, though without the drugs, the investigators, one of whom was Captain Wolf himself, rapidly became nauseated by this ear irrigation. Rhythmic rotation of the head while the eyes fixed a spot on the ceiling also failed to induce nausea after the atropine-prostigmine combination, but did induce nausea without it.

The drugs prevent nausea, apparently, by blocking inhibition of stomach contractions. In the tests, Captain Wolf had found that the first effect on the body of nauseating stimuli was to stop the normal activity of the stomach. This inhibition of stomach activity occurred within one minute of application of the nauseating stimuli and considerably before the skin grew clammy, the eyes began to move rapidly and involuntarily and the person felt dizzy and nauseated.

It was to learn whether nausea would occur without the stopping of stomach activity that Captain Wolf tried the effects of atropine and prostigmine. The drugs did keep the stomach contracting at the normal rate and no nausea was felt, from which it is concluded that the drugs might be used to prevent seasickness.

EYEGLASSES AND DIET

A WORLD of the future in which no one will need to wear eyeglasses because the mothers of the race will eat a superior diet was predicted by Dr. Russell M. Wilder, of the Mayo Clinic, at the wartime conference on nutrition by the Institute of Medicine of Chicago.

Application to human diets of existing knowledge of nutrition, beginning early in childhood and continuing through life, may reasonably be expected, he said, to delay the development of presbyopia, the kind of farsightedness that comes in middle life or old age, and even prevent the development of cataract. "It may even be supposed," he continued, "that astigmatism, longsightedness and shortsightedness will be found to be preventable" by suitable nourishment of the mother during the development of the eye of the unborn child. "In that case wearing glasses may become outmoded."

Nightblindness and certain other eye diseases are known to be caused by faulty diet. The eye, Dr. Wilder pointed out, like other organs of the body, is probably affected by diet in still other ways and like the rest of the body is affected by the changes accompanying the process of growing old. Nutritional scientists are finding that in rats, which are much like humans with respect to nutrition and eating, the growing-old process can be greatly delayed by proper diet. Changes in the eyes due to the aging process might similarly be prevented.

The eyes may even help in finding more ways for postponing aging and preventing not merely disease but poor health because the eyes can be examined internally and externally during life.

ITEMS

THREE new and sensitive methods of chemical analysis useful to wartime chemistry are described by Professor John H. Yoe, of the University of Virginia. Two are based on the formation of highly colored compounds with palladium and iron, while the other involves the formation of a slightly soluble precipitate with tungsten. The new reagent for tungsten is important at this time because it will replace war-scarce cinchonine, an antimalarial compound closely related to quinine. Dr. Yoe was assisted by Dr. A. L. Jones, now at Cornell University. The new reaction for palladium developed by Dr. Yoe and Dr. L. G. Overholser is so sensitive that it is possible to measure one part of the element in 300,000,000 parts of solution. For iron a new reagent which permits iron determination at concentration as low as one in 200,000,000 parts of solution, was developed by Dr. Yoe, assisted by Dr. Jones.

THAT lessons in efficient soaring technique can be learned from the world's largest flying birds, the nearly extinct California condors, was pointed out by John H. Storer, ornithologist, of Waltham, Mass., at the autumn meeting of the American Philosophical Society. Two types of wing-tip have been developed by soaring birds. One is pointed, and has reached a highly advanced stage in such birds as albatross and gull. The other presents a slotted surface to the up-currents, giving highly sensitive control, especially in strong but very localized currents such as are found in the mountains. The condor, probably the world's most highly developed soaring bird, has the largest slots. Mr. Storer showed slow-motion pictures of California condors taking off and in flight, showing in detail how they use their feathered control surfaces. He also stated that he is at present carrying on wind-tunnel experiments with models based on these pictures.

THAT crop losses due to heavy rains soaking poorly drained farm areas represent an unnecessary loss to the nation's potential food supply, was stated by John G. Sutton, of the U. S. Soil Conservation Service, in a report to the American Society of Agricultural Engineers. With proper drainage to prevent crop drowning, Mr. Sutton estimates that production output of at least 6,500,000 acres of land now being farmed could be substantially increased. A U. S. Soil Conservation Service survey of "before and after" yields of farms which have recently benefited from construction of drainage facilities shows that the average "bonus" attained in terms of extra bushels produced per acre is as follows: corn, 18; wheat, 5; grain sorghum, 20; rice, 18; potatoes, 39; soybeans, 9. Drainage projects now in use are in many cases not functioning to best advantage. Of the 87,000,000 acres in organized drainage projects, the Soil Conservation Service estimates that almost 25 million acres are in need of rehabilitation. Cost of this land improvement is small in relation to the benefits. Based on experience with large scale operations, it is estimated that at least 80 per cent. of the rehabilitation of open ditch work could be reconstructed at a cost of less than $10 per acre.

Some New Books in Communications and Electronics

Radio Direction Finders

By DONALD H. BOND, Radio Corporation of America. *In press—ready in January*

Combines a qualitative description of practical systems of direction finders for aircraft, shipboard, or fixed station use, and an analytical study of the underlying phenomena.

Fundamentals of Telephony

By ARTHUR L. ALBERT, Oregon State College. 374 pages, $3.25

An elementary treatment, devoted exclusively to telephone communication. Covers the basic principles of electricity and acoustics, transmitters, receivers, telephone sets and circuits, manual and dial systems, etc.

Electrical Fundamentals of Communication

By ARTHUR L. ALBERT. 554 pages, $3.50

Gives the beginning student a sound grasp of electrical fundamentals, from the point of view of communications—telegraphy, telephony, and radio. The text is organized so logically and written so clearly that students find it easy to understand.

Radio Engineers' Handbook

By FREDERICK E. TERMAN, Stanford University. 1019 pages, $6.00

An exceptionally thorough and comprehensive reference book presenting a wealth of technical information especially selected and organized to meet the needs of the engineer dealing with practical radio and electronic problems.

Basic Radio Principles

By MAURICE G. SUFFERN, Capt., U. S. Army. 256 pages, textbook edition, $2.25

A text on radio fundamentals, enabling the student to identify materials used in radio, interpret the diagrams, and understand the principles involved in the operation of radio equipment.

Graphical Constructions for Vacuum Tube Circuits

By ALBERT PREISMAN, Capitol Radio Engineering Institute. 237 pages, $2.75

Treats nonlinear circuit problems, particularly vacuum tube circuits, from the graphical point of view. Material derived from recent research is included in the discussions of balanced amplifiers, detectors, and inverse feedback.

Practical Radio Communication

By ARTHUR R. NILSON, Nilson Radio School, N. Y., and J. L. HORNUNG, formerly of New York University. 927 pages, textbook edition, $5.00

Provides effective radio school and home study material for prospective and experienced radio operators of all classes. Covers radio principles, aviation radio, broadcasting, and marine radio.

Television Standards and Practice

Selected Papers from the Proceedings of The National Television System Committee and Its Panels. Edited by DONALD G. FINK, Managing Editor, (on leave), *Electronics*. 541 pages, $5.00

Conveniently presents the most important facts—the gist of the intensive work of The National Television System Committee in determining a comprehensive and consistent set of standards to be used as the basis of public television service.

Microwave Transmission

By JOHN C. SLATER, Massachusetts Institute of Technology. 309 pages, $3.50

Steers a middle course between very elementary and very advanced standards. Microwaves are treated from the standpoint of both conventional transmission lines and Maxwell's equations.

Frequency Modulation

By AUGUST HUND, Member of Navy Radio and Sound Laboratory, San Diego, Calif. 375 pages, $4.00

Gives a critical engineering treatment of all phases of frequency modulation, from basic principles to the design of commercial apparatus. The practical applications follow the latest and best engineering practice.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C. 2

SCIENCE NEWS

Science Service, Washington, D. C.

AN ELECTRON MICROANALYZER

CHEMICAL elements composing such extremely minute submicroscopic objects as the tail or head of a germ or a virus, particles no larger than 1/100,000 of an inch in diameter, can be identified in a few minutes by a new instrument, the electron microanalyzer, developed by Dr. James Hillier, of RCA Laboratories at Princeton and reported by him in a communication to *The Physical Review*.

As a running mate to the electron microscope, the new instrument will allow the determination of the composition as well as the size, shape and internal structure of the particles which a few years ago were quite beyond the most powerful means of exploration in the microscopic world.

In the electron microanalyzer a very small area of the specimen is irradiated with an electron probe, a stream of these particles of electricity brought into a beam by a two-stage magnetic lens system. The electrons transmitted by the irradiated area of the specimen are focused by a third magnetic lens so that the electron probe is reformed. The amount of energy lost by the electrons is measured through a photographic exposure, and the position of markings in the electron velocity distribution indicates the presence of a chemical element in the specimen. The new instrument is now in experimental use.

In discussing the future significance of the microanalyzer, Dr. Hillier said that before the knowledge obtained by the use of the electron microscope can be applied by any of the physical, chemical and biological sciences, it must be translated into a form that is of significance to the individual problems being investigated.

"After looking at an electron micrograph and noting the physical characteristics of the object," he continued, "the scientist invariably asks, 'What is this?' He knows that he had a test tube of a specimen consisting of a number of chemicals, but now he has within his vision a number of different types of particles which are undoubtedly made up of some of the chemicals from the original bulk specimen.

"If the original specimen was a test tube of bacteria, the scientist knew that it consisted of a number of proteins and other organic materials. But on looking at the electron micrograph, he finds that the bacteria have flagella, cell membranes and structure in their protoplasm which often includes granules and particles surrounding it which he did not know existed. To find out the chemical structure of these particles, he must perform a number of tests on the bacteria. This procedure is very tedious, and not always successful."

VACCINATION AGAINST TUBERCULOSIS

INCREASED possibility of preventing tuberculosis by vaccination is seen in research by Dr. Truman Squire Potter, of the Laboratory of Preventive Medicine of the University of Chicago, according to an announcement from the university.

The vaccine which Dr. Potter believes will be effective, although it has not yet been tried on human beings, is made from tuberculosis germs that are killed by suffocating them. Vaccines against tuberculosis have in the past been made either from living but weakened strains of the germs or from germs that were killed by heat or chemicals. None of these has been generally accepted as safe and effective, although promising results have been reported with B.C.G. vaccine, made from living, attenuated tubercle bacilli.

The suffocation of the tuberculosis germs must be done under carefully controlled conditions which include an absence of oxygen, presence of moisture and a temperature high enough to keep the germs' metabolism active. Under these conditions the germs die partly as a result of self-sabotage. By continuing their living processes they deprive themselves of oxygen as they breathe, and since no more is supplied them, they suffocate.

Destruction of the germs by this method, Dr. Potter believes, is less likely than other methods to reduce or destroy the tuberculosis antigen. Antigen stimulates the body's defensive mechanism so that, when vaccination is successful, the body defenses are ever on guard in suitable strength to overcome fresh invasion of the germs that produce the antigen. This is the principle of vaccination in general. In the case of tuberculosis, the problem has been to find a way of getting enough antigen into the body to develop immunity without giving so much or giving it in such form, for example in living germs, that it will cause tuberculosis.

In his latest research, reported to the Society for Experimental Biology and Medicine, Dr. Potter used a vaccine from asphyxiated human-type tuberculosis germs to protect rabbits. Of 33 vaccinated rabbits, only four showed minimal lesions of tuberculosis when large doses of virulent germs were injected into their veins after the vaccination. Of 33 unvaccinated rabbits, 25, including three that died, showed frequent severe lesions.

PUTTING FLUORIDE ON TEETH ABOUT 40% EFFECTIVE IN REDUCING AMOUNT OF OF DECAY DURING YEAR

PUTTING a 2 per cent. solution of sodium fluoride on the teeth of a group of school children reduced by about 40 per cent. the amount of caries, or decay, in the teeth of these children during the following year, is reported by Dr. John W. Knutson, dental surgeon of the U. S. Public Health Service, and Professor Wallace D. Armstrong, of the University of Minnesota, in *Public Health Reports*, the official publication of the federal health service.

Fluorides in drinking water, it was discovered some years ago, will, if present in high enough concentration, cause the ugly tooth condition of mottled enamel. Lesser amounts of fluorides in the water, though failing to cause mottled enamel, apparently protect the teeth against decay. Efforts to use fluorides locally instead of through the drinking water to control teeth decay have previously

NEW WILEY BOOKS

THE CHEMISTRY OF ORGANIC MEDICINAL PRODUCTS

By GLENN L. JENKINS, *Dean and Professor of Pharmaceutical Chemistry, School of Pharmacy, Purdue University,* and WALTER H. HARTUNG, *Professor of Pharmaceutical Chemistry, School of Pharmacy, University of Maryland.*

For those concerned with pharmaceutical, chemical, biological, and medical science. Organizes the large number of organic medicinal compounds according to the accepted scheme of chemical classification. Ready in January.

Second Edition: Approx. 645 pages; 5½ by 8⅜; Probable price, $6.50

THE CHEMISTRY OF CELLULOSE

By EMIL HEUSER, *The Institute of Paper Chemistry.*

A study of the scientific aspects of the subject, useful both to the practicing chemist in industrial and other research laboratories and to the student who wishes to specialize in cellulose chemistry. Ready in January.

Approx. 630 pages; 5½ by 8⅜; Probable price, $7.00

THE ORGANIC CHEMISTRY OF SULFUR

Tetracovalent Sulfur Compounds

By CHESTER M. SUTER, *Director of Chemical Research, Winthrop Chemical Company, Inc.*

A comprehensive and thorough treatment of the subject. The book considers the practical value of compounds, as well as their chemical properties. Methods of preparation are given, and general properties, common reactions and derivatives. Ready in January.

Approx. 758 pages; 5½ by 8⅜; Probable price, $10.00

SECOND YEAR COLLEGE CHEMISTRY

By WILLIAM H. CHAPIN, *Emeritus Professor of Chemistry,* and L. E. STEINER, *Associate Professor of Chemistry; both at Oberlin College.*

Takes into account the new discoveries and general development of chemistry in recent years. Much up-to-date material on such subjects as atomic radii, the distribution of velocities of molecules, crystalline solids, the chemical bond and its relation to the structure of compounds. Published in November.

Fifth Edition: 582 pages; 5½ by 8⅜; $3.75

A LABORATORY MANUAL OF PLASTICS AND SYNTHETIC RESINS

By G. F. D'ALELIO, *Director of Research, Pro-phy-lac-tic Brush Co., Florence, Mass.*

Designed to demonstrate certain chemical principles, this book includes practically all the well-known resins and plastics which can be prepared readily, even in a small laboratory. Intended for use by college students who have had organic chemistry. Published in December.

134 pages; 7½ by 10½; $2.00

JOHN WILEY & SONS, Inc.

440 Fourth Avenue **New York 16, N. Y.**

been made by other investigators on small groups of children, with apparently some success.

The group treated under the direction of Dr. Knutson and Professor Armstrong numbered 289. Their teeth were compared at the end of the year following treatment with those of a control group of 326 children in the same schools. Before the treatment, children of both groups had been suffering about the same amount of tooth decay.

Only the teeth in the upper and lower left quadrants of the mouth were treated. There were 39.8 per cent. fewer new carious teeth in the treated than in the untreated teeth at the end of one year. The treatment did not, however, prevent decay from attacking undecayed surfaces of teeth previously attacked by decay. In other words, about 40 per cent. of teeth that had no decay or cavities were protected from caries, but teeth that already had cavities or decay spots were not protected.

If this is borne out by further studies, it means that the fluoride treatment can prevent caries, but not arrest it once it has started. In that case, it probably is a more effective preventive than the 40 per cent. figure indicates, because undoubtedly, it is pointed out, some of the new caries developing in the treated teeth had started before treatment, but was not far enough along to be detected when the teeth were examined before treatment was started.

The 2 per cent. solution of sodium fluoride used is highly poisonous and must be used and guarded with extreme caution. Whether this is the weakest effective solution and whether eight treatments, the least number given in the study, are more than needed are among questions to be answered by further studies.

FORMOSA

THE Island of Formosa has or had an air field important to Japan in her attempts to hold the Philippines and other areas to the south. It is strategically important for other reasons. It lies only 90 miles off the Chinese mainland shore. Shipping bound from Japan to Singapore, Sumatra, Java, Borneo, and to ports in Indo-China, Thailand and Burma passes close to its eastern shore.

Formosa, acquired by Japan in 1895 after the Sino-Japanese war, is called by them Taiwan, the Chinese name. The name Formosa, meaning "the beautiful," was given to it by early Spanish navigators who were impressed with the beauty of its scenery.

The area of the island is about 14,000 square miles, nearly equal to that of Massachusetts, Connecticut and Rhode Island combined. It had a pre-war population of over 5,500,000, the great majority of whom were of Chinese blood. It had also some 115,000 people of so-called native blood. It produced before the war large quantities of rice and sugar and other agricultural products, exporting annually approximately $130,000,000 worth, most of which went to Japan proper.

Formosa is an elongated oval about 225 miles in length from north to south, and 60 to 80 miles wide near its center. It is just beyond the string of islands called Ryukyo which extend southwesterly from Japan. It is mountainous, particularly on its eastern side. Mt. Morrison, or Niitaka Yama, is 14,700 feet in height, and Mt. Sylvia, or Setzu-Zan, is nearly 12,500 feet in altitude. The eastern shores are precipitous. The Pacific waters off the shore are deep. Agricultural lands lie to the west of the mountains. The Formosa strait, between the island and the Chinese mainland, is indicated on charts as shallow.

From northern Formosa to Toyko is approximately 1,300 miles. It is about 700 to the southern portion of the southern island, Kyushu, in the homeland group of the four principal Japanese islands. Formosa is about 175 miles from the northern extremities of the Philippines.

ITEMS

A NINTH magnitude comet has been discovered by the Dutch astronomer, Dr. H. van Gents, at present on the staff of the Union Observatory at Johannesburg, South Africa. Moving rapidly it was diffuse in appearance. The comet was found very close to Nova Puppis, the new star which blazed out so brilliantly in November a year ago. This is purely a coincidence, however, there being no physical significance in this fact. Observers in the United States will have difficulty in studying the comet, which is moving rapidly to the southwest. Its path may carry it so far south as to bring it completely below our southern horizon so that professionals and amateurs in Mexico, South America, South Africa and Australia will have to carry on the study. At the time of its discovery on November 27 at 5: 15 P.M., EWT, the new comet had a right ascension of eight hours, seven minutes and a declination of minus 34 degrees, 14 minutes. Its daily motion, as reported to Harvard Observatory, clearing house in the United States for such information, was eight minutes, six seconds to the west and one degree, 30 minutes to the south.

THE shortest day of the year will be Wednesday, December 22. Winter officially comes to the northern hemisphere that day at 1: 30 P.M., EWT, the time of the winter solstice. The word solstice literally means sun-standing-still, for the sun appears to rise always to the same height at noon for several days around that time. Ancient peoples, who regarded the sun as a god, must have watched with apprehension the gradual sinking of the noon-day sun. Would it begin to climb again as they had been taught, or disappear forever? The sun finally appeared to stand still and then reversed its direction. But a few days after the actual solstice were always needed in order for the ancients to be absolutely sure, then there was great rejoicing. This festival occurred each year at just about the time that Christmas is now celebrated.

ALLOY steels and the development of the ferro-alloy industry are responsible for the great strides made in engineering, was stated by Dr. B. D. Saklatwalla, consulting Pittsburgh metallurgist, in the Richards lecture of the Electrochemical Society. Low-alloy structural steels are widely used now in artillery equipment, army trucks, railroad cars and for other purposes. "The economic implications of alloys are very far-reaching. Their ability to impart high strength to steel, whereby lighter structures with equal strength can be produced, was recognized early and formed the basis of our mass production automotive industry." Low-alloy, high-strength, corrosion-resisting steels may be the steel industry's answer to the challenge of aluminum, magnesium and plastics.

Blakiston Books

Cummins and Midlo

Finger Prints, Palms and Soles

An Introduction to Dermatoglyphics

This new book is designed to fill the need for a comprehensive treatise on the subject in which the latest knowledge and progress is recorded. The authors show many new applications in practical science work of the knowledge presented including valuable data on a much neglected phase of human biology. The book is of interest to anatomists, physical anthropologists, geneticists and zoologists as well as those dealing with identification studies alone.

Nature Magazine, says: "This book is an excellent example of modern, painstaking, detailed research; the amount of documented material is enormous, and very well illustrated. . . . It is a splendid new addition to the literature of human biology, anthropology, genetics, criminology, and related fields."

By HAROLD CUMMINS, Ph.D., and CHARLES MIDLO, M.D., *Tulane University, School of Medicine*. **149 Illus. 309 Pages. $4.00** (1943)

Snell (Editor)

Biology of the Laboratory Mouse

This book provides in one convenient volume all the data concerning the mouse that are of use to the laboratory worker. It is the joint work of the staff of the Roscoe B. Jackson Laboratory, under the editorship of Dr. G. D. Snell. A chapter on Infectious Diseases of Mice, by Dr. J. H. Dingle (Harvard) is included.

Science, says: "Altogether this is an excellent book, and by writing it the staff of the Jackson Laboratory has made another distinctive contribution. It will be very helpful to investigators in the fields of genetics, tumors, endocrinology, as well as pathology and biology in general.

172 Illus. 497 Pages. $7.00 (1941)

Strong

Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases. 6th Ed.

This book offers an authoritative and practical account of tropical diseases, their clinical manifestations, diagnosis and latest methods of treatment. It discusses the zoological aspects and the laboratory procedures of importance and gives attention to health problems relating to the prevention of infectious diseases. It also includes a special study of the occurrence and prevalence of diseases in Central and South America and to important recent investigations on tropical medicine.

Science, says: "An outstanding contribution to the literature on tropical medicine. It provides an enormous amount of detailed information . . . there is no single work which approaches the usefulness of this text."

By RICHARD P. STRONG, M.D., Sc.D., D.S.M., *Professor of Tropical Medicine Emeritus, Harvard University*. **398 Illus. Tables. 1827 Pages. $21.00** (1942)

THE BLAKISTON COMPANY

PHILADELPHIA 5, PA.

SCIENCE NEWS

Science Service, Washington, D. C.

ASTRONOMY

EVIDENCE of gold in the sun was obtained by comparative study of gold spectrum lines and the solar spectrum.

Thorium, rare radioactive element, was discovered in the sun by detecting lines in the solar spectrum that matched lines of thorium produced in the laboratory.

The sun entered a new 11⅓-year sunspot cycle with the first new spot group appearing as expected well away from the sun's equator and one of the last spot groups of the old cycle still visible close to the equator.

New comets discovered were: Diamaca, Oterma III.

Periodic comets rediscovered were: Comas-Sola, last seen in 1935; Comet d'Arrest, last seen in 1923.

A nova or exploding star was discovered in the constellation Aquila.

Nova Puppis, discovered in November, 1942, faded below naked-eye visibility.

The shell of the star 48 Librae was found to be composed of separately rotating hot layers.

In February, Comet Whipple II increased its brightness by nearly two magnitudes in a sudden and unexplained manner.

Nitro-hydrogen molecules made up of more than two atoms and hitherto unidentified in comets were found by spectrogram measurements to be numerous in the heads of Comet Cunningham and Comet Whipple II.

One star of the binary Beta Cephei was found to be the brighter member in a double star with a period of 50 years.

CHEMISTRY AND PHYSICS

BIOTIN, recently discovered vitamin of the B group, was made synthetically, thus affording more ample supplies for research in human nutrition.

A new method of preserving vitamin C in evaporated milk by sealing the evaporated milk tins in an atmosphere of nitrogen or under vacuum was developed. This increases by 50 per cent. the vitamin C retained after six months' storage.

Riboflavin (vitamin B_2), important in the prevention of certain eye and skin diseases, was found to be present in the soil and in a special yeast first isolated from sour milk.

Two important vitamins, riboflavin and thiamin, were recovered in quantity from brewery wastes by the use of an insoluble synthetic resin, Amberlite IR–100.

An inexpensive process for recovering a billion pounds of food protein annually from wheat used for alcohol production was developed.

A process for obtaining large quantities of protein for possible human consumption from a "defatted" corn germ was developed.

A concentrated protein extract to be used as a substitute for scarce grain in livestock rations was obtained by chemical treatment of grass.

A method for quicker and cheaper removal of proteins from distillery wastes by use of bentonite, a fine clay, was developed, thus affording valuable protein cattle food.

A sticky starch, used as a substitute for tapioca and for textile sizing and finishing and for paper coatings was made from certain kinds of corn and sorghum.

Wheat gluten, a by-product in the manufacture of wheat starch, was found to make a good adhesive when dissolved in dilute ammonia.

Foods dried in a natural gas atmosphere, which is later burned to heat the dehydration unit, retained almost all their vitamin C and original color and taste.

The mechanism by which auxins, hormone-like substances, stimulate plant growth was discovered to be by the release of an enzyme, diastase, from protein colloidal substances.

A new kind of synthetic rubber, Paracon, was developed which will be valuable as a special replacement for natural rubber, particularly in the aircraft industry.

New war gases, nitrogen mustards, were developed and found to have a milder blistering action than mustard gas and to cause blindness.

For the first time 100,000,000-volt x-rays, 50 times greater than any previous voltage, were produced.

Radar, a locator using ultra-high frequency radio waves, although developed earlier, was announced.

A new phosphorescence microscope for the examination of objects by their own short-lived glow after ultraviolet irradiation was devised.

A huge optical glass disk, the largest prism ever made, measuring 26 inches in diameter, graduated in thickness from one and one half inches to three and one quarter inches and weighing 260 pounds, was successfully cast for use in an astronomical telescope.

EARTH SCIENCES

PARICUTIN, a new volcano 200 miles west of Mexico City, arose from a cornfield to a height of 1,000 feet and is the first whose entire life is recorded scientifically.

Evidence of a long wet spell 120 million years ago was found in fine white clays of the Southwest.

The 250 million-year-old fossil remains of a giant amphibian with a skull more than two feet long were found in Texas.

Legendary pit of Tasco, Mexico, known as Hell's Mouth, was found to be only 500 feet deep instead of a mile and was dynamited to close it and prevent its use as an illegal execution spot.

Issuance of daily weather maps and fuller forecasts by the U. S. Weather Bureau was resumed when it was concluded that this information would be of less value to the enemy than to our own war efforts and production.

There were 43 earthquakes of sufficient strength to record themselves on distant seismograph instruments; notable among them was a double shock off the coast of Japan in the same region where the disastrous tidal wave of 1933 started.

McGraw-Hill Announces

THE PENNSYLVANIA STATE COLLEGE MINERAL INDUSTRIES SERIES

"This new series is to include books that will serve as texts and reference works for students and industrial personnel interested or employed in one of the various phases in the field of mineral industries. Broadly, this field includes the primary and secondary processing industries which are engaged in finding, recovering, and processing the mineral wealth. The books of this new series are written in such a manner that the highly technical subjects necessarily covered are presented in the most fundamental way possible, and yet retain in full the industrial applications of all phases of the subjects covered."

—H. B. NORTHRUP, Director, Mineral Industries Extension, The Pennsylvania State College

AVIATION GASOLINE MANUFACTURE

By MATTHEW VAN WINKLE, University of Michigan; formerly of The Pennsylvania State College. 274 pages, 5¼ x 8¼. $3.00

Fills a definite need for a text in the highly specialized and important field of gasoline manufacture. The author deals with the manufacture of base stocks, high octane hydrocarbons, the finished fuels, and special fuels and the characteristics of such fuels in use in aircraft engines. The book also covers the processes used, specifications, tests, etc., and is a source of original references.

FERROUS METALLURGY

By E. J. TEICHERT, Metallurgist, E. G. Budd Mfg. Co.; formerly of The Pennsylvania State College

Volume I. Introduction to Ferrous Metallurgy

Second edition. 475 pages, 5¼ x 8¼. $4.00

This is the first of a series of three volumes written to embrace the entire field of ferrous metallurgy. In this first volume the treatment is new in that it includes fundamental science and related subject matter vital to an understanding of metallurgical processes. Presented in logical sequence the topics covered are pyrometry, metallurgical fuels and their combustion, refractories, fluxes, slags, iron ores, the iron blast furnace and manufacture of pig iron, the iron foundry, malleable iron, wrought iron, and the manufacture of crucible steel.

Volume II. The Manufacture and Fabrication of Steel

Second edition. 468 pages, 5¼ x 8¼. $4.00

In this volume the author covers all the common methods in the manufacture and processing of steel, including its primary fabrication. The latest and best available information on plant practice is embodied in the text through the cooperation of leading manufacturers in the field. Topics discussed include the Bessemer process, the basic open hearth process, the acid open hearth process, the electric furnace processes, special steel making processes, the steel ingot, the fabrication of steel, rolling mill practice, etc.

Volume III. Metallography and Heat Treatment of Steel. *In preparation*

Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York 18, N. Y. Aldwych House, London, W.C.2.

New deposits of quartz, suitable for use in military radio and radar apparatus, were discovered in North Carolina, Virginia, California and Arkansas.

Ancient ocean beds in Idaho and Wyoming were found to contain vanadium, estimated at millions of tons.

BIOLOGICAL SCIENCES

ABOUT 200,000 quinine-bearing cinchona plants, grown from seeds rescued from the Philippines during invasion, were sent to neighboring republics for planting.

Fresh evidence that virus disease particles are giant protein molecules capable of reproduction and parasitic feeding within living cells was obtained by means of the ultra-centrifuge, which whirls solutions at high speeds and separates and sorts the particles.

A strain of mold was induced by x-ray to undergo genetic changes from which were established many pure lines specifically deficient in ability to synthesize dietary essentials; these strains offer new approaches to the study of biochemistry and genetics and have also proved extremely valuable in delicate chemical analysis of food.

Plant tumor bacteria, when deprived of power to cause abnormal growths through use of glycine regained it when treated with hormones; bacteria from the tumors thus caused were unable to produce new tumors unless again aided by hormones.

A deadly poison, extracted from a microbe in the soil, was discovered as a possible rodent exterminator when laboratory tests revealed it not as a germ killer for mice, but a killer of the mice instead.

Large-scale use was made of an enzyme formed in mass-cultured mold for the splitting of starch into sugar for fermentation into industrial alcohol.

Special strains of yeast were developed, having nutritious qualities and flavors of meats and other foods.

A new synthesized female sex hormone was developed by combining sulfur with the natural female hormone, estrone.

Prenatal control of sex of fruitflies was accomplished by genetic selection.

Pellets of synthetic female sex hormone, diethylstilboestrol, inserted under the skin of young roosters, made them resemble hens.

Tests and experience of new tillage methods, dispensing with mold-board plows that turn all the vegetation under, proved highly successful.

Night-time temperature was found to affect differently blossom induction and other activities of warm-climate plants and cool-climate plants.

ENGINEERING AND TECHNOLOGY

THE "pancake" Diesel engines now powering Navy ships were revealed to put out more than four times the power per pound of former Diesel engines and to occupy only a third of the space.

Gas turbines capable of initial temperatures of 1,500 degrees Fahrenheit were made possible by the development of heat-resistant alloys.

A speedy, economical process for food dehydration which for the first time reduced the moisture content to 1 per cent. was developed through use of radio-frequency energy.

Copper-covered steel wire for high frequency communication lines was developed and found as efficient as solid copper wire.

Special thick-walled tires built to be run without tubes were produced for Army use.

Tubeless tires completely filled with an anti-freeze solution of calcium chloride as an inner liner for preventing air diffusion were developed.

Speedy continuous tinplating processes, which save much tin, were developed by the use of new and improved chemicals in electroplating.

A non-skid, fireproof plastic material containing particles of garnets went into use on battleship decks to prevent slipping accidents.

The bazooka, using deadly rocket projectiles with highly brisant explosive charge, was announced as a new war weapon and proved effective in combat.

A new and superior optical glass, made without sand, was developed from common chemicals such as boric acid, zinc oxide and aluminum hydroxide.

A walnut-sized searchlight, projecting a 1,500 candle-power beam of light visible for 65 miles at sea, was designed.

Colored smokes from grenades aided American tanks in identifying themselves to friendly planes in the Tunisian campaign.

A new airplane compass, the Gyro Flux Gate Compass, which is not affected by bombload, motion of the plane, armor plate or other metal parts of the plane, was developed.

The Army's new submachine gun, M3, was scheduled to supplant all other weapons of the same type due to performance records and the fact that it can be produced without complicated machine tools.

"Electrical nurses" for the 20-inch pipeline between Texas and the East Coast were developed to record temperature of motors, pumps and bearings, pressure in the pipe and direction of fuel flow.

Plastic lithographic printing plates, replacing critical zinc and aluminum, were made from polyvinyl alcohol resin for use in printing colored maps and documents and in mobile field printing units.

Washing films and prints, after fixing with hypo, first with sea water and then with fresh water, was found to speed the job in photography.

A compact, easily portable mercury flash lamp outfit which takes photographs with an exposure of only one-millionth of a second was developed.

Stainless steel sheets were stitched together with an electric thread or current which shoots clear through the metal and fuses the sheets together at their inner surfaces.

FLIGHT PREPARATION TRAINING SERIES

Published under the Supervision of the Training Division,
Bureau of Aeronautics, U. S. Navy

Mathematics for Pilots

157 pages, 4½ x 7⅜, illustrated. 75¢

Covers the algebra, geometry, and trigonometry that every pilot must know. A feature of the book is the large number of problems taken from navigation and principles of flying.

Physics Manual for Pilots

229 pages, 4½ x 7⅜, illustrated. 90¢

Gives a condensed treatment of most of the topics included in a standard high school physics text. All fundamental principles needed by the pilot are discussed.

Principles of Flying

338 pages, 4½ x 7⅜, illustrated. $1.50

Aims to acquaint the student with the basic principles involved in flying, including the rudiments of airplane construction.

The Effects of Flight
Mental and Physical Aspects

120 pages, 4½ x 7⅜, illustrated. 60¢

Explains the causes of the many physical sensations which the aviation cadet encounters for the first time in his flight training.

Operation of Aircraft Engines

206 pages, 4½ x 7⅜, illustrated. 90¢

Explains the operation of the internal-combustion engine, pointing out the refinements which make it possible to adapt it for use in airplanes, where decreased weight and increased horsepower are essential.

Aerology for Pilots

107 pages, 8¼ x 11, illustrated. $1.25

What the pilot should know about aerology. Emphasis is placed upon understanding of weather reports and making of personal weather observations.

AIR NAVIGATION

Part I. Introduction to Earth

79 pages, 8¼ x 11, illustrated. $1.00

Designed to orient naval aviation cadets to navigation that may encircle the earth. The book gives an over-all view of the earth as a sphere, of place relationships of war zones.

Part II. Introduction to Navigation

81 pages, 8¼ x 11, illustrated. $1.00

Covers the basic fundamentals of navigation technique. There is a detailed explanation of the various types of map projections.

Part III. Dead Reckoning and Lines of Position

60 pages, 8¼ x 11, illustrated. $1.00

Introduces some basic applications of the fundamentals covered in the first two volumes.

Part IV. Navigation Instruments

Approximately 200 pages, 8¼ x 11, illustrated.
In preparation

Contains detailed physical description and discusses the functions and practical application of all instruments used in aircraft navigation.

Part V. Relative Movement

118 pages, 8¼ x 11, 76 illustrations. $1.25

Covers in detail the problems encountered by the pilot of one- and two-seat service planes, together with solutions, by means of the plotting board, used by these pilots.

Part VI. Contact Flying

Approximately 125 pages, 8¼ x 11, illustrated.
In preparation

Introduces the student to flight planning, charts, landmarks, radio ranges, multiple courses, bent beams, orientation, and other aspects of contact flying.

Part VII. Nautical Astronomy and Celestial Navigation

Approximately 200 pages, 8¼ x 11, illustrated.
In preparation

Tells the student what to do and then shows him how and why he does it. Definitions are introduced by practical application of the principles involved. Work sheets, plotting, and exercises are given.

Send for copies on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street, New York 18, N. Y. **Aldwych House, London, W.C. 2**

SCIENCE NEWS

Science Service, Washington, D. C.

SCIENCE IN 1943

(Continued from issue of December 24)

MEDICAL SCIENCES

HOPE of a penicillin conquest of venereal disease was held out by reports of cures of syphillis and gonorrhea by this safe, potent chemical from molds which has also been reported effective in treatment of gas gangrene, osteomyelitis and other staphylococcal infections, empyema, pneumococcus pneumonia and hemolytic streptococcal infections.

A new drug for fighting malaria and one sufficiently promising to be worthy of trial under field conditions was announced by the War Department, though the name of the drug was not released.

"Continuous caudal analgesia," which banishes the pain of childbirth by means of continuous injection near the base of the spine of a pain-killing chemical, metycaine, was announced and said to give promise of further surgical usefulness for war wounded.

Possibility of using chicken serum to develop vaccines to protect against, or antiserums to cure, certain virus diseases, such as virus pneumonia, parrot fever, trachoma and lymphogranuloma venereum, was suggested by announcement of a chicken antiserum that definitely protected mice against a virus pneumonia.

Folic acid, one of the new B vitamins, was found to have an important role in blood cell production in studies showing it cured anemia and agranulocytosis induced by sulfonamides in white rats and that lack of it in the diet caused agranulocytosis in monkeys, anemia in chickens.

Thiamin, vitamin B_1, was discovered to be manufactured by the intestinal bacteria of humans, a finding likely to change earlier views of vitamin requirements.

Two 24-hour sulfa drug cures for impetigo were announced, one using sufadiazine in a jelly that gives a plastic coating and needs no bandage, the other using microcrystalline sulfathiazole.

A method of creating nerve banks, constituting a supply of quick frozen and dried nerve fragments for nerve grafts, was developed and found successful in laboratory animals with clinical use as a future possibility.

The first clinical use of nerve grafts from cadavers with acacia used to glue the graft in place was reported with good results in the first two cases.

The production of safe vaccines against two types of encephalitis, or sleeping sickness, the St. Louis and Japanese B types, effective, according to blood tests, in half or more of the vaccinated, was announced.

A specially treated cotton, oxidized cellulose, which is safely absorbed by the body, was found to aid in stopping bleeding during operations on the brain or elsewhere when the material was soaked in blood-clotting thrombin, and gave promise of further medical and surgical usefulness.

The use of plasma, sulfa drugs and other drugs and the technique of quick evacuation of wounded to advanced surgical centers accounted for the return to active duty after hospitalization of 41 per cent. of United States Army war wounded, and 53 per cent. of Navy and Marine wounded.

The United States Army with the aid of vaccines won an almost 100 per cent. battle for its overseas troops in combatting diseases, of which the typhus victory is especially noteworthy.

A second, more potent weapon against disease germs, penatin, was discovered in the same mold which yields penicillin.

Chemical methods were developed for taking salt out of sea water and making it drinkable.

Large-scale production of penicillin, germ-fighting chemical remedy from mold, was started, aided by development of two more productive strains of the mold and use of fermentation as well as surface culture methods of growth.

As a current make-shift method, the utilization of gauze saturated with culture medium in which the mold was growing permitted the application of penicillin to open wounds.

A major factor in causing sterile marriages and stillbirths was traced to incompatibility of the parents with regard to a newly recognized blood factor, Rh, and a method of distinguishing couples who are doomed to childlessness from this cause from those who have a chance of having some normal babies was developed.

New triumphs reported for sulfa drugs included speedy recovery of shipyard eye (epidemic keratoconjunctivitis) by sulfathiazole desoxyephedrine treatment; controlling scarlet fever epidemics by sulfadiazine; and preventing epidemic diarrhea of the newborn and curing "babies' sore eyes" due to gonorrhea by succinyl-sulfathiazole.

A new sulfa drug, desoxyephedronium sulfathiazole, reported to bring prompt relief in colds and to shorten their duration, and the prevention of ear and sinus infections after a cold by a sulfadiazine spray were announced.

New sulfa drugs which were developed include phthalylsufathiazole, for treatment of intestinal infections such as dysentery, and sulfamerazine, for pneumococcus pneumonia, meningitis, gonorrhea and streptococcus infections.

Two possible anti-influenza weapons suggested by tests on laboratory animals were inhalation of small concentrations of triethylene glycol vapor in air and inhalation of a globulin fraction of influenza immune horse serum.

New methods of nerve repair and grafting, so far used only in animals, which were developed were use of an artery cuff to guide the blind growth of fibers from cut nerves in nerve splicing and use of a sliding sleeve extension made out of a stump of the severed nerve for the same purpose.

Repair of skull injuries by plates of tantalum, rare metal which is strong, light weight, easily malleable, does not corrode, is not poisonous and does not cause foreign

body reaction, and use of tantalum wire for suturing nerves and tantalum foil wrappers to keep regenerating injured nerves free from scar tissue were reported.

Initial success of a new method of treating goiter by medicines instead of by surgical operation was announced using the medicines, thiourea and thiouracil, which have the unique property of inhibiting the function of the thyroid gland, actually, it is believed, preventing production of its powerful hormone.

A method which simplifies treatment of diabetics and gives better control of blood sugar was developed by mixing two forms of insulin, slow-acting protamine zinc insulin and rapid-acting regular insulin.

Banishing toothache due to exposed dentin, common cause of dental pain, and desensitizing sensitive areas in the filling of cavities were reported to have been achieved by a new sodium fluoride treatment.

Red blood cells, formerly a waste by-product in the large-scale production of blood plasma, were salvaged and used successfully in place of whole blood in the treatment of anemia and, when dried and powdered, to hasten wound healing.

The right of the U. S. Food, Drug and Cosmetic Administration to set standards of identity for enriched food was upheld by decision of the U. S. Supreme Court.

Treatment of burns with a new plaster cast method, which stops pain, rests and protects the burned part from further injury, prevents swelling and slowing of the blood circulation in the burned area, showed good results in clinical cases.

Innovations developed for aiding in skin grafting included refrigeration anesthesia of the area from which the skin is to be taken; use of a dye, sodium fluorescein, injected into a vein to indicate when the circulation has been established in the graft; and use of a chessboard pattern, sticky paper method to fix small bits of skin for grafting over a large area.

In the search for a morphine substitute without addiction property, relief of intractable pain in patients with inoperable cancer was obtained by three chemicals, known for short as M3, M4 and M7, developed following the lead of female sex hormone synthesis.

Fish juices as a substitute for water for shipwrecked men in lifeboats were found to maintain life for protracted periods without danger to health.

ARCHEOLOGY AND ANTHROPOLOGY

AN inscribed strip of bronze, indicating existence of a monarch who claimed the title "king of the world" 2500 years ago, was discovered in Palestine.

Complete human remains, 7,000 to 10,000 years old, were discovered near Abilene, Texas, in a man-made grave of undoubted antiquity.

Human bones estimated to be about 10,000 years old were found in California, thus furnishing a further clue to the appearance of the early North American Indian.

The discovery of a number of important pre-Inca sites in the Cuzco region of Peru was announced in the United States.

Further evidence of the relationship in pottery styles between the mainland of South America and the West Indies, denoting similar culture, was announced.

Records, made public in the United States, indicated that the first human inhabitants of the northern coast of Chile were two separate fishing populations followed by an agricultural culture.

AERONAUTICS

A SUPER-BOMBER, the B–29, which is superior to the B–17 and the B–24 in range, firepower and load, was reported in production.

The 70-ton Martin "Mars," world's largest flying boat, was turned over to the Navy after completion of the last of a series of grueling tests.

The Grumman "Hellcat," a Navy fighter plane which retains the heavier firepower, better armament and leakproof gas tanks of the "Wildcat" and has increased range, speed, climb, maneuverability and altitude capacity, went into combat against the Jap "Zero."

Airplane anti-icers, which shoot hot air through ducts on wing and tail surfaces, were perfected and installed on long-range patrol bombers, it was announced.

Formation of ice on propeller blades was prevented by a strip of electrically conductive rubber on one edge of the blade.

Three super-aircraft carriers of 45,000 tons, capable of handling larger multi-engined planes, were authorized and the construction of one started.

A new 24-passenger, twin-engine airplane, considerably smaller than the familiar DC–3, having about half the power and costing half as much, was designed.

A new 8-ton Navy torpedo plane, "Seawolf," carrying a crew of three, was scheduled for quantity production.

Powerful rocket jets were reported used by the Germans as auxiliary power to assist heavily loaded planes in the take-off, and experiments are under way in this country.

"Cycleweld," a new process of putting together aluminum alloy, wooden or rubber aircraft parts without riveting or welding but by using a specially prepared cement and applying heat and pressure to the joint, was announced.

An automatic computing sight for aerial gunners was announced as standard equipment for all "Flying Fortresses."

The electronic autopilot, which keeps a heavy bomber rigidly on its course while approaching the target during high altitude precision bombing missions, was announced.

The flight-ray was developed to utilize a cathode-ray tube to read multiple flight instruments and warn the pilot when any instrument deviates from its setting.

A waterproof radio transmitter to SOS automatically over an approximate area of 100,000 square miles was developed for use in emergency rafts.

An airplane windshield that will not ice up and that will stop 15-pound birds collided with at 200 miles per hour was developed.

8 REINHOLD BOOKS

DRYING AND DEHYDRATION OF FOODS

by H. W. von Loesecke

A timely book of intense interest to anyone in the food industry. In a succession of condensed chapters is contained up-to-the-minute informative material on the various steps involved in the drying and dehydration of foods, types of equipment used, the dehydration of vegetables, dairy products, fish and meats, including specific figures for moisture content, yield, processing losses and drying temperatures, plant sanitation, factory cost, packaging, storage, and the nutritional value of these foods with special reference to vitamin content and taste.

302 Pages **Illustrated** **$4.25**

A Course in POWDER METALLURGY

by Walter J. Baeza

This book is designed as a practical course of instruction in the technique of this new art. It maps out a clearly conceived plan for acquainting students with the essentials of successful, uniform production of powder metallurgy parts. 15 experiments and results are described, with graphs showing the relationships between the processes involved and all the properties of the finished products. Of inestimable value to any manufacturer or to teachers of metallurgy and related subjects.

16 Illustrations 41 Graphs

212 Pages **$3.50**

TUNGSTEN

Its History, Geology, Ore-Dressing, Metallurgy, Chemistry, Analysis, Applications, and Economics

by K. C. Li and Chung Yu Wang

The increasing importance of tungsten in the metallurgical and electronic industries has evoked a need for a comprehensive treatment of its geology, processing and uses, which this book expertly meets. Written by two outstanding authorities in the field, it presents detailed discussions of the occurrence, composition and preparation of tungsten ores in all parts of the world. Includes three striking color reproductions of tungsten alloys, maps and other illustrations. A valuable reference work for all those concerned with the uses or properties of this important metal.

325 Pages **Illustrated** **$7.00**

VEGETABLE FATS AND OILS

The Chemistry, Production and Utilization of Vegetable Fats and Oils for Edible, Medicinal and Technical Purposes

by George S. Jamieson

Revised and re-written to include new information from South America this monograph is packed with vital details on the sources of these products, their characteristics, composition, properties and uses; commercial and laboratory processes for the preparation and extraction of fats and oils from oleaginous seeds, clarification, bleaching, deodorization, hydrogenation, refining and other treatments in special cases are discussed. Grading is described. Methods are given for sampling, for examination of seeds, oils, fats, press cake and meals as well as tests for evaluation purposes and for the detection of adulterants . . . all exhaustively documented.

A. C. S. Monograph #58

508 Pages **$6.75**

REINHOLD

330 West 42nd St.,

Blakiston Books

Examination of Waters and Water Supplies—SUCKLING

5th Edition

This authoritative new edition is a complete guide to the solution of all modern problems concerning the examination, estimation and purification of waters and water supplies, including physical, biological, chemical and bacteriological methods. Attention is given to the problems that may have to be solved in the post-war period—softening installations, purification, new water supplies, etc. By Ernest Suckling, M.R.C.S., D.P.H. (London). **63 Illus. 849 Pages. $12.00** (1943)

Theory of Emulsions and Their Technical Treatment—CLAYTON

4th Edition

This is a thorough study of emulsions with emphasis on their technical treatment and industrial application. There is included a study of bitumen emulsions (problems of breaking); biological emulsions (problems of interfacial effects and inversion); insecticides and fungicides (problems of wetting); milk and butter (influence of the air/liquid interface), etc. Many useful tables and new illustrations are included. By William Clayton, D.Sc., F.I.C. (London). **103 Illus. 492 Pages. $10.00** (1943)

Organic Reagents in Inorganic Analysis—MELLAN

All organic reagents are described and their reactive groups and resulting compounds are demonstrated graphically. 230 qualitative, 240 quantitative tests (colorimetric, gravimetric and volumetric) are included. By Ibert Mellan, M.Sc., F.A.I.C. (Philadelphia). **682 Pages. $9.00** (1941)

Lecture Experiments in Chemistry—FOWLES

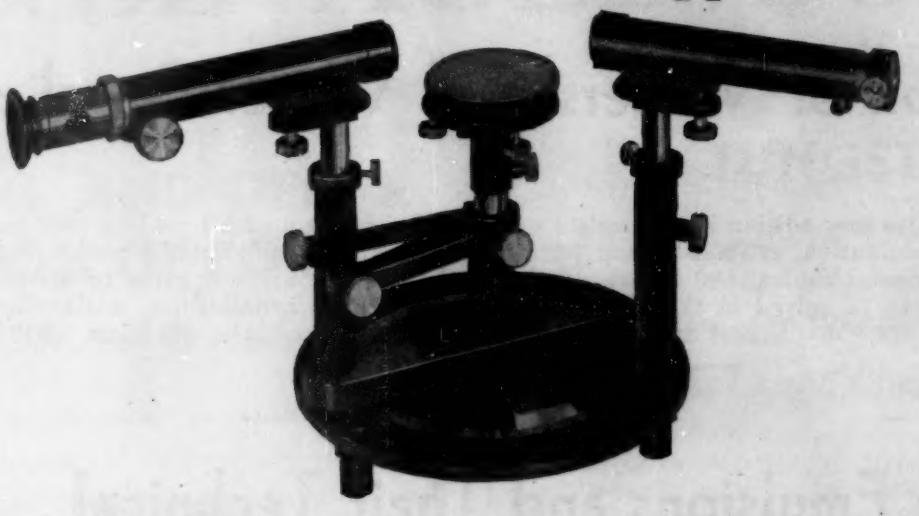
2nd Edition

This book describes 547 experiments in chemistry and gives detailed instructions for classroom demonstrations. Notable features are: simplicity of apparatus, notes on reagents, historical data, bibliographies, and constructive suggestions to teachers. By G. Fowles, F.C.S. (Eng.). **150 Illus. Tables. 564 Pages. $5.00** (1939)

THE BLAKISTON COMPANY

Philadelphia 5, Pa.

An inexpensive Spectrometer ideal for instruction in its uses and applications

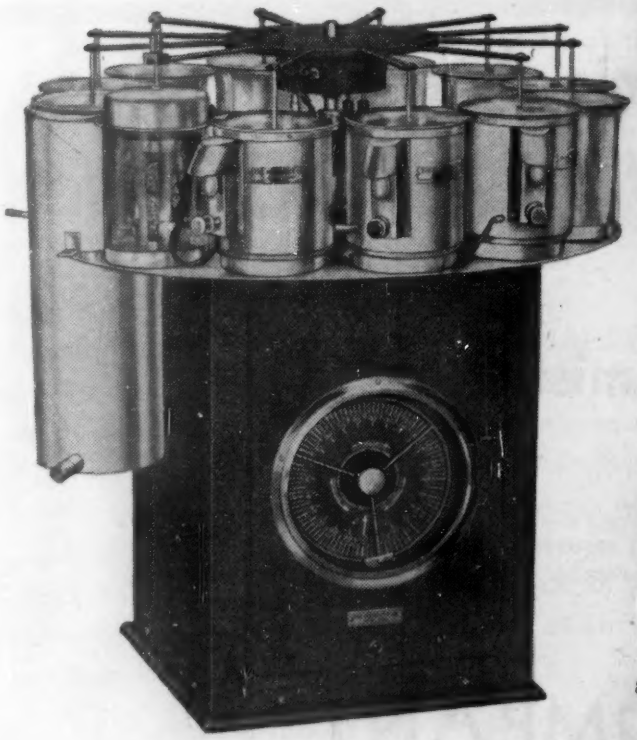


This instrument has all the essential adjustments of larger more expensive models and can be used for all the standard experiments. The 125mm circle reads to 1 minute by vernier. Collimator and telescope have 20mm apertures. An adjustable 8mm slit is provided. The telescope is supplied with the high power Gauss eyepiece, rack and pinion focussing, and a tangent screw for delicate adjustment.

Send for Bulletin 144-04

THE GAERTNER SCIENTIFIC CORPORATION

1204 Wrightwood Avenue **Chicago 14, U. S. A.**



THE AUTOTECHNICON

U. S. Patent No. 2,157,875 and Other Patents Pending.

THE TECHNICON CO.
NEW YORK, N. Y.

For Standardization and Special Research Procedures

● The following forms of crystalline carotene, isolated and purified in the Research Laboratories of S.M.A. Corporation, are currently available:

ALPHA CAROTENE—CRYSTALLINE

10 milligram ampul..... $5.00

BETA CAROTENE—CRYSTALLINE

10 milligram ampul..... $ 5.00
100 milligram ampul..... 40.00

CAROTENE—CRYSTALLINE (90% Beta—10% Alpha)

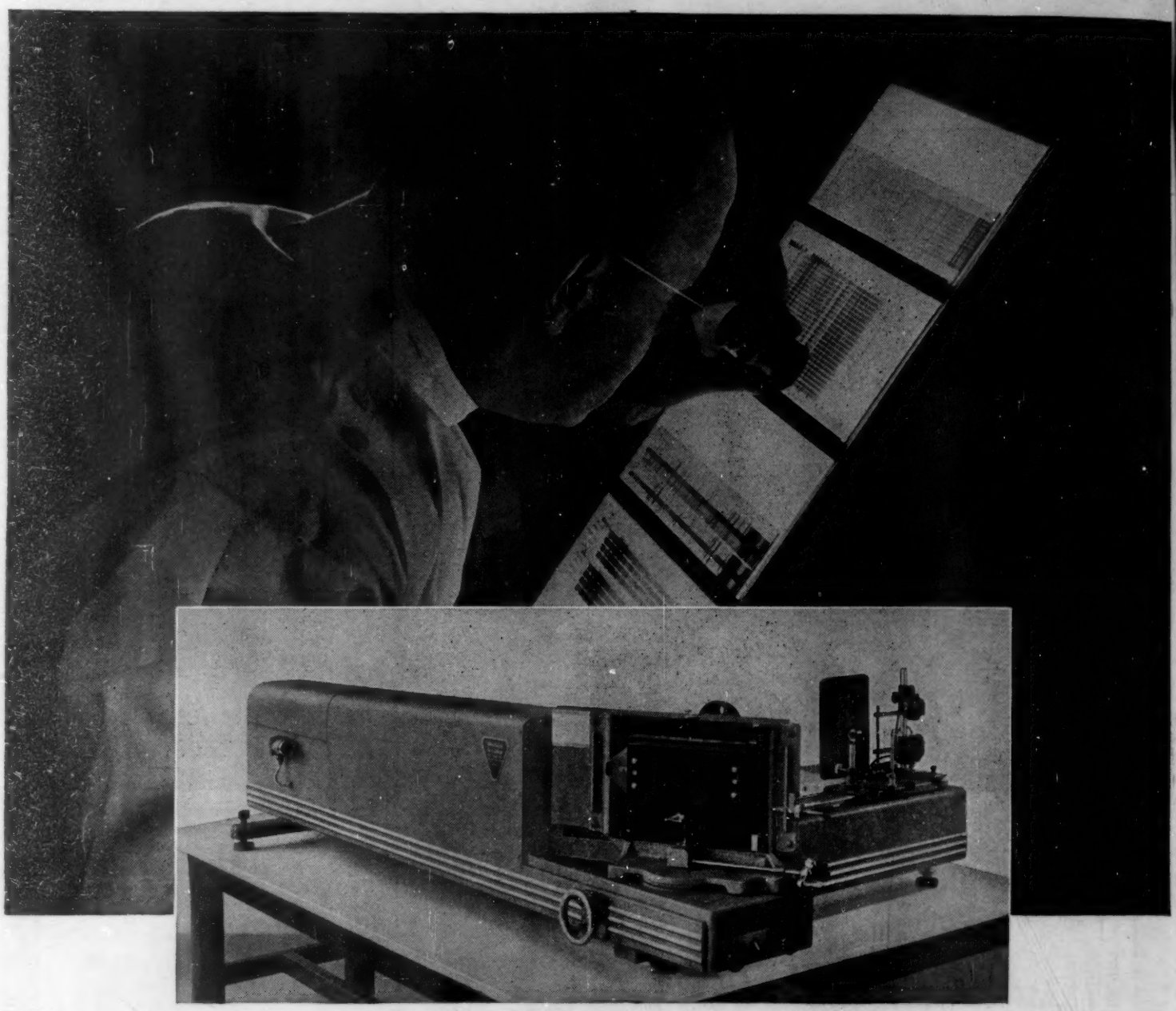
100 milligram ampul..... $ 2.00
1 gram ampul..... 5.00
50 gram ampul..... 145.00
100 gram ampul..... 285.00

Crystalline carotene is supplied in vacuum sealed ampuls to insure complete protection of its biologic activity. Write Research Laboratories, S.M.A. Corp., Chagrin Falls, Ohio.

Research Laboratories

S. M. A. CORPORATION

DIVISION **WYETH** *INCORPORATED*



Bausch & Lomb Large Littrow Spectrograph

Standardized Control for Today's Vital Products

From vitamins to battleships, America's war production moves forward faster and more effectively because of the standardized control spectrography makes possible.

This is another example of the application of the peacetime experience of Bausch & Lomb to a vitally important war role. In 1943, as in 1917, this experience acquired in the development and manufacture of optical instruments, peacetime education, research and industry becomes one of America's most valuable wartime assets.

The B&L Spectrographic Equipment is but one of many B&L optical instruments of peacetime science, industry and education that serve with growing usefulness beside the B&L Optical Instruments of war.

Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to peacetime pursuits when Victory is won.

For Bausch & Lomb Instruments essential to Victory—priorities govern delivery schedules.

BAUSCH & LOMB

OPTICAL CO. • ROCHESTER, NEW YORK

ESTABLISHED 1853

AN AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION